CONSEIL PERMANENT INTERNATIONAL POUR
L'EXPLORATION DE LA MER

RAPPORTS

ET

PROCÈS-VERBAUX DES RÉUNIONS

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DIX-NEUVIÈME RÉUNION

COPENHAGUE — SEPTEMBRE 1926.

BUREAU DU CONSEIL:

M. H. G. Maurice, Président du Conseil.
M. Otto Pettersson, Vice-Président du Conseil.
M. J. Hjort, Vice-Président du Conseil.
M. T. Tissier, Vice-Président du Conseil.
M. F. Drechsel, Secrétaire-Général du Conseil.

MEMBRES DU CONSEIL ET EXPERTS

et leurs adresses:

Allemagne: M. le Dr. C. Heinrici, Secrétaire d'Etat à disposition, Président de la Commission scientifique allemande pour l'Exploration de la Mer, Potsdamerstrasse 22a, Berlin.
**Expert: M. le Dr. W. Mielck, Professeur, Directeur de la Station Biologique de Helgoland.

Belgique: *M. H. Baels, Ministre de l'Agriculture, Administrateur de sociétés de pêche, membre de la chambre des Représentants, échevin de l'industrie et du commerce, Avenue Serruys 64, *Ostende.*
M. G. Gilson, Professeur, Ostende-Phare, *Ostende.*
Expert: M. Léon Verbrugghe, Administrateur-directeur de l'armement ostendais, *Ostende.*

Danemark: M. le Commandeur C. F. Drechsel, Strandvej 34, *Copenhague.*
M. le Dr. Martin Knudsen, Professeur à l'Université, Polyteknisk Læreanstalt, *Copenhague.*
Experts: M. F. V. Mortensen, Directeur des Pêches, Christiansgade 6, *Copenhague.*

* N'a pas assisté à la réunion.
** La nomination du Professeur Mielck comme second délégué allemand a été notifié par une lettre du Ministère des Affaires Etrangères de Danemark en date du 31 mars 1927.

M. le Dr. A. C. JOHANSEN, Directeur de la Station biologique danoise, Strandvej 34, *Copenhague.*

M. le Prof. JOHS. SCHMIDT, Directeur du Laboratoire Carlsberg, Section de Physiologie, *Valby, Copenhague.*

M. le Dr. C. H. OSTENFELD, Professeur à l'Université et Directeur du Jardin Botanique, Gothersgade 140, *Copenhague.*

Espagne: M. le Professeur ODÓN DE BUEN, Directeur Général du Service des Pêches et de l'Institut Espagnol d'Océanographie, Professeur de Biologie à l'Université de Madrid, Président de la Section d'Océanographie à l'Union Internationale Géodésique et Géophysique, Lagasca 116, *Madrid.*

M. le Professeur RAFAEL DE BUEN, Secrétaire de la Délégation espagnole, Chef de l'Institut espagnol d'Océanographie, Secrétaire Général de la Commission Internationale de l'Océan Atlantique (Union Internationale Géodésique et Géophysique), Alcalá 31, *Madrid.*

Experts: *M. le Professeur J. GIRAL, Chef de la Section de Chimie de l'Institut espagnol d'Océanographie.

*M. le Dr. FERNANDO DE BUEN, Chef de la Section de Biologie de Institut espagnol d'Océanographie.

*M. le Capitaine de Vaisseau LEON HERRERO, Directeur de l'Observatoire de la Marine de San Fernando (Cadix).

*M. le Colonel J. GALBIS, de l'Institut Géographique espagnol.

*M. le Capitaine de Vaisseau SEBASTIAN NOVAL, Chef de la Section administrative de la Direction Générale des Pêches.

Finlande: M. le Dr. T. H. JÄRVI, Professeur, Directeur de l'Institut scientifique des Pêches, *Helsingfors.*

M. le Dr. WITTING, Professeur, Directeur de l'Institut pour l'Exploration de la Mer, *Helsingfors.*

France: M. THÉODORE TISSIER, Président de Section au Conseil d'État, Président du Conseil d'Administration de l'Office Scientifique et Technique des Pêches Maritimes, Vice-Président du Conseil International, 13 rue Monsieur, *Paris.*

* N'a pas assisté à la réunion.

*M. Lecourbe, Directeur du Service des Pêches Maritimes au Sous-Secrétariat de la Marine Marchande, 24, rue du Boccador, *Paris.*

Experts: M. le Dr. Ed. le Danois, Directeur de l'Office Scientifique et Technique des Pêches Maritimes, Secrétaire Général de la Commission de la Méditerranée, 3, avenue Octave Gréard, *Paris.*

*M. le Professeur Louis Joubin, Membre de l'Institut, Professeur au Muséum National d'Histoire Naturelle, Directeur de l'Office Scientifique et Technique des Pêches Maritimes, 55, rue du Buffon, *Paris.*

Grande Bretagne: Mr. H. G. Maurice, C. B., Fisheries Secretary, 43, Parliament Street, *London.*

Mr. David T. Jones, C. B. E., F. R. S. E., Chairman of the Fishery Board for Scotland, *Edinburgh.*

Experts: Professor D'Arcy W. Thompson, C. B., F. R. S., The University, *St. Andrews.*

Dr. E. S. Russell, Director of Fishery Investigations, 43, Parliament Street, *London.*

Mr. J. O. Borley, O. B. E., Fisheries Laboratory, *Lowestoft.*

Mr. A. Bowman, D. Sc., F. R. S. E., Scientific Superintendent, Fishery Board Laboratory, *Aberdeen.*

Mr. T. Edser, 43, Parliament Street, *London.*

Mr. W. C. Hodgson, Fisheries Laboratory, *Lowestoft.*

État Libre d'Irlande: *Mr. Charles Green, Inspector of Fisheries, 3, Kildare Place, *Dublin.*

Mr. G. P. Farran, Assistant Inspector of Fisheries, 3, Kildare Place, *Dublin.*

Expert: Mr. R. Southern, 3, Kildare Place, *Dublin.*

Lettonie: M. V. Miezis, Ministère d'Agriculture, *Riga.*

Norvège: M. le Professeur Johan Hjort, à l'Université, *Oslo.*

M. S. K. Asserson, Directeur des Pêches, *Bergen.*

Experts: Mr. Oscar Sund, Laboratoire du Dir. des Pêches, *Bergen.*

Mr. Paul Bjerkan, Laboratoire du Dir. des Pêches, *Bergen.*

* N'a pas assisté à la réunion.

Pays-Bas: M. le Dr. J. J. Tesch, Chef de la Section "Pêche maritime" de l'Institution Gouvernementale pour l'examen biologique des poissons, *la Haye.*

*M. P. M. van Riel, Directeur-adjoint de l'Institut Royal Néerlandais Météorologique, *De Bilt.*

Pologne: M. Michel Siedlecki, Professeur de Zoologie à l'Université de Cracovie, *Cracovie.*

Portugal: Le Portugal n'était pas représenté à cette réunion.**

Suède: M. le Dr. O. Pettersson, Professeur, *Holma, Gåseberg, Bohuslän.*
M. le Dr. Gustaf Ekman, Södra Hamngatan 11, *Göteborg.*
Experts: M. le Professeur V. W. Ekman, à l'Université, *Lund.*
M. le Dr. K. A. Andersson, Directeur des Pêches Maritimes, Kungl. Lantbruksstyrelsen, *Stockholm.*

Invité:

Italie: M. le Professeur G. Magrini, *Venise (Stra).*

* N'a pas assisté à la réunion.

** Il est entendu que les personalités suivantes ont été nommés délégués du Portugal auprès du Conseil:—

M. le Contre-Amiral Augusto Ramas da Costa et M. le Docteur Alfredo Sobral Mendes de Magalhaes Ramalho.

La confirmation officielle de cette nomination n'a pas été reçue jusqu'à présent.

AGENDA

for the nineteenth meeting of the International Council for the Exploration of the Sea

1. Opening of the Proceedings by the President.
2. Report by the General Secretary as to the present participation and to the adherence for a further period of 5 years.
3. Administrative Report.
4. Final Approval of the Accounts for 1924—25.
5. Statement of Accounts for 1925—26.
6. Estimates for the financial year 1926—27.
7. Programmes of Committee meetings laid by the Consultative Committee.
8. The Plaice Question. Statement by the President.
9. Proposal by the Transition Area Committee regarding Saving Trawl experiments.
10. Revised Scheme for the Journal.
11. Proposal by Professor OSTENFELD regarding Plankton programme.
12. Proposal by the Bureau regarding Hydrographical Service and Appointment of a Hydrographer at the Bureau.
13. Communication by Professor HJORT about the Special Committee for a closure of the Moray Firth.
14. Communication about proposals regarding International Expeditions.
15. Memorandum by Professor HJORT with regard to Professor O. DE BUEN'S proposal for the protection of whales.
16. Consideration of Reports and Programmes of the Committees.
17. Nomination of the members of the Bureau, the Finance Committee, the Editorial Committee, and the Editors.
18. Time and place for the next Council meeting.
19. Other business, including any recommendations of the Consultative and Editorial Committees not falling under any of the items above.
20. Conclusion of the meeting.

REPORT

of

the 19th Meeting of the Council.

Plenary meetings were held in Copenhagen on September 6th and 8th.

The Committees of Atlantic Slope, North Western Area, North Eastern Area, North Sea, Baltic, Transition Area, Statistics, Hydrography, Plankton and Limnology as well as the Editorial and the Consultative Committees held meetings from the 1st to the 8th af September.

First Sitting: Monday, September 6th, at 11 a. m.

The President, Mr. MAURICE, in the chair.

Present: The members and experts (vide list pp. 4—7), except those of Germany.

Under **Point 1** of the Agenda the President formally opened the proceedings in the following words:—

Messieurs les Délégués et Experts,

J'ai l'honneur de déclarer ouverte la XIX^{ième} session du Conseil International. Encore une fois nous nous réunions à Copenhague et sommes à nouveau les hôtes de cette ville agréable et magnifique. Aussi est ce notre devoir de commencer par adresser à Sa Majesté le Roi de Danemark un télégramme pour lui rendre nos hommages.

Il m'est agréable de formuler en votre nom des souhaits de bienvenue à M. RAFAEL DE BUEN, délégué de l'Espagne, à M. TESCH, délégué de la Hollande, et à M. HODGSON, expert britannique, qui siègent pour la première fois parmi nous.

Malheureusement le délégué de la Belgique, M. BAELS, m'a prévénu d'être empeché d'assister à cette réunion du Conseil. Il nous envoie ses meilleurs désirs pour le succès de nos travaux.

La présence de M. le professeur MAGRINI dans cette salle est significante. Elle est le symbole de la coopération scientifique internationale. En effet M. MAGRINI est le Secrétaire Général de la Section d'Océanographie de l'Union Géo-

désique et Géophysique du Conseil International de Recherches. Il est de plus un des délégués italiens à la Commission Internationale de la Méditerranée. Récemment à Venise j'ai eu l'honneur de représenter notre Conseil dans les réunions de la Section d'Océanographie et aux séances de la Commission de la Méditerranée. Je remercie M. MAGRINI de nous rendre si promptement et si courtoisement notre visite. Je salue de plus en lui le représentant du Royaume d'Italie; ses compatriots tout en soutenant une pêche intensive sur leurs côtes viennent maintenant jusqu'à la Mer du Nord et leurs chalutiers travaillent à côté des notres. Aussi nos débats sont ils de nature à interesser grandement M. MAGRINI.

Messieurs, le personnel du Conseil International a été durement éprouvé par la perte de Mlle HANSEN, dont tous les membres du Conseil ont su apprécier la serviable amabilité.

Et maintenant, Messieurs les Délégués et Experts, il me reste à vous rappeler que l'année dernière dans mon premier discours j'adressais les condoléances du Conseil au sujet de la mort de l'Amiral NEUPARTH au Délégué du Portugal, au Colonel CHAVES. Par une pénible fatalité j'ai le cruel devoir d'avoir cette année à déplorer la disparition de ce dernier. Le Colonel CHAVES était notre ami à tous — il était le mien en particulier — il ne comptait que des sympathies dans notre Conseil. Tous savaient apprécier l'homme comme ils appréciaient le savant qui a tant fait pour le développement scientifique dans son pays. Le Colonel CHAVES est une grande figure qui disparaît — il aurait pu personifier la constance et la fidélité aussi bien dans ses amitiés que dans ses principes. Il avait su garder intacte son loyalisme au Roi dont il avait été le précieux collaborateur sans sacrifier à ce sentiment l'amour de sa patrie à la grandeur scientifique de laquelle il a tant contribué. Pour mieux mettre en lumière l'ami que nous perdons, je lirai ces quelques lignes de son compagnon de travail pendant trente ans, M. le professeur JOUBIN:—

"Je viens d'apprendre avec le plus grand chagrin la mort du Colonel CHAVES. C'était un ami de près de trente années, et je puis vous assurer que sa disparition sera vivement ressentie par tous les anciens collaborateurs du Prince ALBERT de Monaco, autant que par moi-même.

Le Colonel CHAVES par ses voyages, ses missions, ses travaux, sa direction de l'observatoire météorologique des Açores a rendu les plus signalés services à toutes les sciences de la mer.

Vous avez pu voir, l'année dernière à Copenhague, combien il avait été frappé par la mort de son vieil ami l'amiral NEUPARTH; il est cruel de constater que, deux fois en moins d'un an, le Portugal est atteint dans sa représentation au Conseil.

J'aurais été heureux si j'avais pu cette année, comme les précédentes, me rendre à Copenhague, et saluer une dernière fois la mémoire du Colonel CHAVES. Les circonstances m'en empêchent à mon grand regret. Mais il est bon que ceux des membres du Conseil qui ne le connaissaient que depuis deux ans sachent que c'est à la haute et juste influence dont il jouissait dans son pays, qu'est due l'adhésion du Portugal au Conseil.

Je tenais, mon cher Président, à vous dire mon sentiment, et mon émotion, puisque je n'aurai pas le plaisir de vous voir le mois prochain".

Referring to the death of Colonel CHAVES Professor ODÓN DE BUEN spoke as follows:—

Je remercie notre Président de l'occasion qu'il me donne de dédier un hommage à la mémoire de mon regretté et bon ami, M. le Colonel CHAVES, représentant du Portugal dans le Conseil.

Le Colonel CHAVES a été un travailleur infatigable, un défenseur comptant de la coopération internationale dans les études de l'atmosphère et de la mer. Ami intime et collaborateur de S.A. le Prince ALBERT de Monaco il dédia une partie de ses activités à l'étude de la région océanique voisine aux Açores. La situation admirable de son observatoire météorologique et sa grande expérience lui permirent prêter des services d'une énorme valeur à l'avancement des problèmes météorologiques.

Le Conseil a perdu avec le Colonel CHAVES un des partisans les plus fervents. La Délégation espagnole spécialement perd avec lui un des meilleurs amis qui ne pourra jamais être oublié.

Malgré qu'il n'appartenait pas à notre Conseil nous ne devons pas laisser passer sous silence la grande perte expérimentée par la science océanographique avec la mort de l'Amiral FRANKLIN PARRY, Président du Bureau Hydrographique International.

La Délégation espagnole, profondément touchée par cette perte exprime leur condoléances les plus vives à la Délégation de la Grande Bretagne.

Mr. MAURICE bowed to Professor ODÓN DE BUEN to express the thanks of the British Delegation for his words of sympathy.

Le Prof. MAGRINI remercie très vivement Mr. le Président qui a bien voulu lui faire tenir l'invitation d'assister à l'importante réunion actuelle. Il lui est également très reconnaissant des aimables paroles de bienvenue qu'il lui a adressées et dont il fut véritablement touché d'autant plus que le Conseil tout entier eut l'amabilité de manifester son approbation. Le Prof. MAGRINI fut invité à se rendre à cette réunion, non seulement à titre de secrétaire de la Section internationale d'océanographie du Conseil international de recherches, mais aussi comme italien. Bien que l'Italie ne fasse pas encore parti de cet illustre Conseil, il espère que bientôt sa patrie sera appelée à participer à ces travaux qui intéressent au plus haut degré la science de la mer et ses applications dans la pratique.

Il fit remarquer, comment l'importance des recherches océanographiques a été reconnue déjà, tant dans l'intérêt de la science que dans celui de la pêche et de la navigation si bien que, tous les gouvernements, attribuent à ces recherches la plus haute valeur.

Le Conseil international pour l'exploration de la mer de Copenhague, la plus ancienne et la plus glorieuse des organisations océanographiques et dont nous aurons d'ailleurs le plaisir de célébrer, l'année prochaine, le 25ème anniversaire, a mérité tout particulièrement des résultats très importants obtenus jusqu'à ce jour.

D'autres Commissions ont été constituées par la suite: La Commission de la Méditerranée qui a déjà de remarquables traditions, et les deux autres grandes Commissions qui sont en voie de formation, celle de l'Atlantique et celle du Pacifique.

Le moment est arrivé où les liens entre ces institutions qui poursuivent un objectif à peu près analogue dans des mers différentes, doivent se resserrer de plus en plus.

Il se réjouit à la perspective de pouvoir assister aux réunions de ces importantes Institutions, comme secrétaire de l'organisation internationale qui leur sert de trait d'union. Cela lui permettra notamment de voir de près comment la science, en mettant à contribution ces puissantes institutions, sert les intérêts de l'humanité en l'aidant à résoudre des problèmes importants à son économie et à sa vie.

Il se réjouit également d'avoir à participer à cette réunion comme italien. L'Italie, qui travaille, depuis plusieurs années déjà, au développement des études de la mer, poursuit à présent la progression de l'industrie de la pêche, problèmes que son Comité talassographique a cherchés systématiquement à résoudre.

Conscient des importants résultats obtenus par le Conseil international pour l'exploration de la mer, siégeant à Copenhague, il n'a pas hésité à proposer à son Gouvernement de demander, selon les règles statutaires, la participation de l'Italie au Conseil.

De son côté, le Gouvernement italien appréciera certainement l'aimable invitation du Président Mr. Maurice.

Le Prof. Magrini termina son discours en exprimant les voeux que ses propositions fussent accueillies, ce qui lui permettrait de participer comme délégué italien à la prochaine réunion.

The General Secretary said: The Danish Ministry of Agriculture has asked me to represent the Ministry at this 19th meeting of the Council and on their behalf to offer the members a hearty welcome to Copenhagen. As you are already aware you are the welcome guests of the Ministry for Luncheon at "Eltham" when there assembled.

Point 2 of the Agenda (Report as to present participation).

The General Secretary reported as follows:—

12 countries are now participating as ordinary members of the Council, viz.:— Belgium, Great Britain, Denmark, Finland, France, Ireland, Norway, the Netherlands, Poland, Portugal, Spain and Sweden. To these must be added Latvia and Esthonia who participate as free members, that is to say without payment of any contribution except such as they are disposed to make according to their means. In each of the last three years Latvia has contributed Kr. 2,000.

You have already been informed by the opening speech of the President, of the changes which have taken place in the membership of the Council. I have

only to add that no representative of Portugal has presented himself as successor to the late Colonel CHAVES.

Since the last meeting of the Council all countries then participating have accepted the Council's proposal of a five yearly period of participation from 21st July 1926 with the usual reservation respecting the agreement of their Parliaments as regards the financial provision to be made. Spain has adhered for an indefinite period, and Finland with a special reservation to the effect that the Finnish Government will not be in a position to give any definite answer to the proposal before December 1926.

I will pass over correspondence regarding matters now settled and will refer only to the inquiry made of the Governments of Belgium, Finland and Portugal as to whether they were now in a position to pay their contributions in full. The Governments have now answered as set forth in the following letter from the Danish Foreign Office:—

"Le Gouvernement Belge, dans une note signée de M. VANDERVELDE, Ministre des Affaires Étrangères, a répondu que les raisons qui ont motivé la faveur d'une réduction au bénéfice du Gouvernement Belge n'ont rien perdu de leur valeur, la situation du change en Belgique ne s'étant pas améliorée. Le Gouvernement Belge espère que dans ces conditions le Conseil International ne se refusera pas à admettre que la cotisation de la Belgique reste provisoirement fixée à 5,000 couronnes.

D'après la réponse du Gouvernement Portugais à ce propos, il lui est impossible d'élever à présent sa cotisation, puisque les circonstances qui l'ont amené à demander de contribuer provisoirement aux dépenses du Conseil par une cotisation réduite n'ont pas changé et se sont même aggravées en raison de la hausse de la couronne danoise et d'autres causes très considérables que le Ministre de Portugal à Copenhague exposera au Gouvernement danois. Le Gouvernement de la République Portugaise tout en désirant de continuer son appui au Conseil et reconnaissant l'utilité de l'oeuvre d'intérêt général qu'il poursuit, se verrait quand même extrèmement embarassé s'il devait prier le Parlement d'approuver un surcroît de dépenses pour le Conseil International.

Le Gouvernement de la Finlande a répondu que sa contribution au Conseil étant fixée à 5,000 couronnes pour l'exercise de 1925—26, il n'est pas possible par des raisons d'ordre technique de l'augmenter pour cette période. Cependant, le Gouvernement à Helsingfors envisage un nouvel examen de la question pour ce qui concerne l'exercise de l'année prochaine".

As to Poland, all participating countries have now agreed to the admission of this country to the Council and to their paying for the time being the reduced contribution of 5,000 Kr. annually. Poland has adhered to the Council for a period of 5 years.

Point 3 of the Agenda (Administrative Reports).

No observations were offered on the Administrative Reports which had been distributed to the members, and were taken as read. (But, in this connection, see Resolution 1 of the Consultative Committee, p. 38.)

Point 4 of the Agenda (Final approval of the accounts for 1924—25).

The General Secretary stated that the accounts of the Council for 1924—25, including a statement of cash in the Bank and Treasury Bills deposited there, had been verified and audited by a qualified accountant, and the accounts scrutinised and found correct by the Finance Committee. He now submitted these accounts to the Council for final approval, and added that they could be inspected at the office. The accounts were approved.

Point 5 of the Agenda (Statement of accounts for 1925—26).

The General Secretary referred to the Statement of accounts distributed at this meeting. With reference to the surplus he pointed out that there was a saving on item IV, Travelling Expenses. This item had last year been raised to 13,000 Kr. as it had been expected that the new organisation would involve some meetings of Area Committees or their chairmen. Furthermore 13,500 Kr. on item VI, Special Resolutions of the Council, had not been spent, as neither the work of the Tidal Institute in Liverpool on the current meter observations, nor Dr. REDEKE's report on pollution of rivers was finished.

Point 6 of the Agenda (Estimates for the financial year 1926—27).

Consideration of the estimates was, as usual, postponed to the final meeting.

Point 7 of the Agenda (Programme of Committee meetings laid by the Consultative Committee).

The programme was accepted as settled.

The President pointed out that the programmes had been anticipated by meetings of several of the Commitees before the Meeting of the Council, and that copies of the programmes adopted by them had been distributed. He suggested that the present meeting should be adjourned to 5 o'clock in the afternoon in order that the Members might have ample time to consider these programmes. This was agreed to, and the meeting was adjourned accordingly.

First Sitting: Monday, September 6th (Resumption after adjournment) 5 p. m.

Present: The Members and Experts, including those of Germany.

The President adressed the following words of welcome to the representatives of Germany:—

M. HEINRICI, M. le professeur MIELCK, représentants de l'Allemagne, soyez ici les bienvenues. Vous n'êtes pas des inconnus pour nous, et douze années d'absence ne nous ont pas fait oublier la collaboration de votre pays à nos premières recherches. Les membres du Conseil se félicitent de vous retrouver à nouveau parmi eux et savent combien fructueuse sera la reprise de nos travaux en commun.

In answer to the President's welcome to the German representatives, Dr. HEINRICI spoke as follows:—

Monsieur le Président,

Permettez-moi de vous remercier des paroles de bienvenue que vous venez de nous adresser. Veuillez croire, Monsieur le Président, et vous, Messieurs les Membres et Experts du Conseil, que les sentiments dont vos paroles font preuve sont entièrement partagés par nous. C'est dans l'espoir d'une bonne collaboration que l'Allemagne rentre dans le Conseil Permanent International pour l'Exploration de la Mer.

Ich gebe dem Dank an den Herrn Präsidenten für die freundlichen Worte erneuert Ausdruck, mit denen er Herrn Professor MIELCK und mich begrüsst hat. Wir freuen uns, wieder einer Vereinigung anzugehören, die eine so bedeutende und geachtete Stellung in der Wissenschaft einnimmt. Von der Ueberzeugung ausgehend, dass die Meeresforschung nur bei zielbewusster, internationaler Zusammenarbeit vollen Erfolg haben kann, hat Deutschland seinerzeit bei der Gründung des Zentralbureaus mitgewirkt und viele Jahre in ihm an den gemeinsamen Aufgaben mit vielen der hier vertreteten Länder zusammengearbeitet. Dass in der Zwischenzeit die Arbeit auf dem Gebiet der Meeresforschung für uns nicht geruht hat, wissen Sie. Wir hoffen, dass nachdem nunmehr die Verbindung mit den im Conseil International tätigen Forschern wieder gesichert ist, unsere Mitarbeit dazu beitragen möge, die Arbeit des Conseils erfolgreich und nutzbringend zu gestalten.

Allow me, Mr. President, to finish by expressing the wish that the international work of the Council under your chairmanship may continue to be successful.

Point 8 of the Agenda (The Plaice question. Statement by the President).

The President referred to the Statement by the British Delegates, distributed to the members and experts, in the following terms:—

"At its meeting in September, 1922, the Council, in a carefully worded resolution, recommended the Proposals of the Plaice Committee to the consideration of the Governments concerned. It is not necessary to repeat here the terms of the Council's Resolution or the recommendations of the Plaice Committee, with both of which the Members of the Council are familiar. It is, however, important to bear in mind that, at the conclusion of its Resolution, the Council drew attention to the difficulty of enforcing any restrictive measure without the sympathetic support of the industry, adding that the practicability of the proposals appeared to be a matter for the consideration of the Governments of the countries concerned.

It is not necessary for the purpose of this memorandum to follow in detail the history of subsequent events. It will be remembered that the proposals of the Plaice Committee were further considered by a Conference of Experts appointed by the Governments concerned, which met at Amsterdam in March, 1925, and were in the main endorsed by that Conference.

The Members of the Council are aware that when the proposals were first submitted, in 1921, to representatives of the British Fishing Industry, they were received with practically

unanimous disapproval, and the British Delegates have never concealed from the Council that the British Government would not be disposed to attempt to enforce regulations which presented so many practical difficulties in the face of active opposition from the industry, and that in their view, the prospect of the acceptance of these proposals without modifications by the British Fishing Industry was remote. The principal obstacle to their acceptance, so far as the British Fishing Industry was concerned was that the suggested regulations would exclude from the selected areas vessels of the type commonly employed by British fishermen while admitting those employed by some at least of their principal competitors in the plaice fisheries and plaice markets. Some attempt to meet this point was made at the Amsterdam Conference, by the Resolution of the Conference in favour of the imposition of a size limit in the countries bordering the zones within which it was proposed that the regulations should be enforced. The imposition of a size limit obviously, however, would not meet the main objection of the fishing industry of a country chiefly interested in steam trawling, and it will be remembered that the French and Belgian Experts made an important reservation based upon the desirability from the scientific point of view of complete closure of the areas in question, or closure as complete as was practicable without inflicting hardship upon fishermen using small boats.

The view taken by the British Government was that if the proposals of the Plaice Committee could be put into operation, some improvement of the Plaice Fisheries of the North Sea would almost certainly follow but that the practicability of enforcing them depended first and foremost upon securing for them the support of the fishing industries of all countries. It was obvious to them that, even with general goodwill, a strict enforcement of the regulations would be difficult, owing to the configuration of the proposed zones, especially having regard to the climatic conditions of the North Sea, as a result of which visibility is often extremely low. They thought, however, that if the broad principle of the proposed regulations were generally acceptable to the fishing industries a means of overcoming the obvious practical difficulties might be devised with their assistance. They did not doubt that the British Fishing Industry, if it approved the principle of the regulations, would make its support of them conditional upon the practically complete closure of whatever areas might be agreed upon. Such a reservation would have had the sympathy of the Government because obviously the more complete the closure could be made without inflicting unwarrantable hardship upon inshore fishermen, the greater would be the prospect of useful results.

The proposals of the Council were accordingly again submitted to the representatives of the British Fishing Industry, coupled with the Report of the Amsterdam Conference and with an explanatory memorandum. But the representatives of the industry expressed the strongest possible objection in principle to any regulations involving the closure of an area of the sea, and they refused accordingly to discuss the proposals of the Council or any modification of them, or indeed any proposals which involved the virtual closure of such an area.

It was in the light of these circumstances that the Government had to take into consideration the proposal to call an international conference in London to discuss measures for the protection of the Plaice Fisheries of the North Sea. The Government were in sympathy with the aim underlying the Council's proposals, namely, the prevention of the capture of young plaice at an age when they are of little commercial value. But they were under the necessity of regarding the question from the point of view of practical considerations, and it was obvious to them that there was no prospect of reaching a satisfactory agreement along the lines of the Council's proposals, for the following reasons:—

1) The support of the British Fishing Industry, which furnishes a larger contingent of steam trawlers in the North Sea than that of any other country, could not be obtained for the proposals even with modifications.
2) The Government were not disposed to attempt to enforce against the fishing industry

proposals, the utility and desirability of which the industry denied and to which they were vehemently opposed in principle.

3) It would, in any case, have been impossible in the face of such opposition to secure the necessary Parliamentary support for the legislation which would be required.

4) Even if general support for the proposals had been secured, it would have been necessary to undertake the policing of a large irregular area of a sea in which low visibility creates great difficulty in fixing positions. The cost of policing would, in any case, have been great; its cost, if the support of the fishermen were not forthcoming, would be prohibitive. On this point, the Admiralty, upon whom falls the duty of enforcing international fishery conventions at sea, were emphatic.

In all these circumstances, the British Government felt compelled to suggest that the proposals of the Council, involving the virtual closure of an area of the sea, should be abandoned. And they were driven to the conclusion that the proposed International Conference would, for the present, serve no useful purpose.

The Government, therefore, without in any sense calling in question the proposals of the Council in their scientific aspect, has no alternative but to ask the Council to consider whether practical measures for the protection of the Plaice Fisheries may not be devised without recourse to the virtual closure of any area of the sea".

He said that neither he nor his colleague Mr. JONES felt that they could usefully add anything to this statement.

Captain DRECHSEL after referring to the long and careful investigation the Council had organised with a view to the protection of the Plaice in the North Sea, expressed regret that practical considerations had stood in the way of a solution of the problem. Denmark was perhaps the country which was, in proportion to her total fishing interests, most concerned in this question. Possibly the British Fishing Industry might, in time, take a different view. Meanwhile it was open to the Council to study other proposals for the protection of the Plaice. In this connection he referred in particular to the subject of minimum sizes and fishing gears designed to spare undersized fish.

The President pointed out that the note of the British Delegates requested the Council to seek other means of protecting the plaice fisheries.

Point 16 of the Agenda (Consideration of Reports and Programmes of the Committees).

The programmes of the Area Committees, which had already been circulated, were referred to the Consultative Committee for their consideration.

Limnological Committee. This Committee having been depleted by the retirement of Dr. REDEKE and the absence of other members, Dr. K. A. ANDERSSON, Professor MIELCK and Dr. RUSSELL were added to it. Dr. ANDERSSON, at the request of the Council, consented to act as Chairman of the Committee for the present.

Date of next year's Meeting. The Council having been invited by the Swedish Government to meet in Stockholm next year to celebrate its 25th Anni-

versary, either about the middle of May or at the beginning of September, it was agreed that a paper should be posted at the office on which members might record their preference for one or other of these dates. On the suggestion of Professor PETTERSSON, it was agreed that members of the Consultative Committee who were not Delegates should also be invited to vote on this question.

The meeting adjourned.

Second Sitting: Wednesday, September 8th, 1926, at 3,30.

The President, Mr. MAURICE, in the chair.
Present: The members, experts (vide list pp. 4—7).

The President opened the meeting and stated that in accordance with the decision of the first sitting of the Council the following telegram had been sent to his Majesty the King of Denmark:—

"A sa Majesté le Roi de Danemark, Sorgenfri.
Les membres du Conseil International pour l'Exploration de la Mer, réunis à Copenhague, demandent la permission de témoigner à cette première séance pléniaire à Votre Majesté leurs sentiments respectueux.

MAURICE, Président, Merexploration".

in reply to which the following telegram had been received from the King:—

"Mes remerciments sincères.

CHRISTIAN R."

Point 9 of the Agenda (Proposal by the Transition Area Committee regarding saving trawl experiments).

On consideration of the recommendation of the Consultative Committee with reference to the proposal of the Transition Area Committee for international investigation of the question of a saving trawl (see p. 42,9) it was agreed that 1,000 Kroner should be available for incidental expenses connected with the exchange of saving gear between different countries participating in the investigation.

The President pointed out that the proposal for an intensive study of saving gears harmonised with the request of the British Delegates for such investigations.

Point 10 of the Agenda (Revised Scheme for the Council's Journal).

The Council took into consideration the revised scheme for the Council's Journal submitted in the following terms by the Editor:—

Scheme for the Council's Journal.

On consideration of the replies to the last circular letter on the subject of the Journal of the International Council, the following arrangement has been

authorised by the Bureau for the present year. The scheme will come up for revision by the Council, with whom the ultimate decision rests, at its next meeting.

Title. "Journal du Conseil international pour l'Exploration de la Mer".

Publisher. The same arrangements as for the other publications of the Council.

Times of issue. Provisionally quarterly, in February, May, August and November. First number: February, 1926.

Format. Same as the Publications de Circonstance, which will be discontinued after the present year.

Editorial office. 43, Parliament Street, London, S.W.1.

Contents. Normally each number will contain (1) a general article on some topic of interest to the Council as a whole, (2) one (or, if short, two) scientific papers of the kind hitherto issued as Pub. de Circ., (3) reviews of important papers relating to fishery research, (4) a bibliography of current publications, (5) notes and correspondence.

The general articles will be written it is hoped in such a way as to be readily understood by all interested in the Council's work.

Bibliography. This will deal mainly with the area covered by the Council's activities, but will not exclude reference to important work in other areas in the North Temperate and Arctic regions. A working arrangement is being sought with the Section of Oceanography of the International Geophysical and Geodesic Union. Limnological papers will not be included nor papers of a purely faunistic or zoological nature, unless of interest in connection with fishery research. Papers relating to brackish waters and to salmon and other freshwater fish studied by the Council will however be included.

Hydrography will be dealt with as fully as possible, excluding however publications which are primarily of cartographical interest.

A short indication of contents may accompany the bibliographical entries.

The bibliography will be printed in the ordinary way on both sides of the page, but arrangements will be made to supply to those who wish it a set printed on one side only, or possibly on separate cards.

Language. Authors of papers are free to write in their own language, but are earnestly requested to write them if possible in one of the four languages which are more or less universally known, namely, English, French, German and Spanish. If the author of a paper finds it necessary to write in some other language, he will be expected to consent to the translation of his paper, before printing, into English or French.

In all cases papers should be accompanied by a summary, written either in English or in French.

Payments to contributors. General articles and reviews will be paid for at the rate of 10 kroners a page.

Price. The subscription price and that for single numbers will be fixed later.

Size of Edition. 1200 for first number.

Extracts. Authors of general articles and scientific papers will be entitled to 50 free copies of their paper.

Free List. The existing free list for the Council's publications will be revised for the Journal and cut down where possible. Due regard will be had to the need for securing a wide distribution and adequate notice of the Journal. Of the first number a large number of complimentary copies will be distributed to likely subscribers, and a final decision as to the subsequent free distribution will not be made until the extent of the subscriptions has been gauged.

Exchange. A general system of exchange with other scientific journals is not proposed, but a measure of discretion should be allowed to the Editor to exchange with journals which might otherwise be difficult to obtain, — for bibliographical purposes.

I take this opportunity of thanking those who have sent me suggestions regarding the Journal and of inviting offers of assistance in the writing of articles and reviews and in sending me papers or references for the Bibliography.

(Signed) E. S. Russell,
Editor.

4th November, 1925.

The Chairman of the Editorial Committee reported that the Editorial Committee had approved the scheme subject to the following two amendments proposed in Committee by the Editor:—

1) In view of the amount of work thrown upon the administrative staff, the Journal should be published three times a year instead of quarterly. This would involve a reduction of the price of subscription, which it was suggested to fix at 12 Kroners. The definite dates of issue would have to depend upon the office and what suited them best.
2) Under the heading "Language", it was proposed to substitute the words "into English or French" at the end of the first paragraph by the words "into one of the four languages mentioned above". The second paragraph should run:— "In all cases papers should be accompanied by a summary".

The scheme as so amended — see page 98 — was adopted.

Point 11 of the Agenda (Proposal by Professor Ostenfeld regarding Plankton Programme).

The following note from Professor Ostenfeld had been laid before the Council:—

At the meeting of the International Council in September 1925 I had the honour to lay before the Plankton Committee a proposal concerning the manner of working out the plankton investigations in future. This proposal was on my own recommendation temporarily withdrawn owing to the new Scheme of Re-

organisation of the Council's work. In particular the question of a Plankton Assistant at the Bureau was postponed to the next annual meeting of the Council (1926).

As the results of the new scheme for work cannot be realised before the meeting in the coming autumn I find it difficult to ask for a final decision on my proposal so soon. I shall therefore recommend the Bureau to send copies of my proposal (Proc.Verb., Vol. XXXVIII, pp. 50—55) to the different members of the new Plankton Committee asking each of them to study it and to be ready to give their opinion on it at the coming meeting. In that manner it will better be possible to form an idea about the opinions held concerning the question, and a postponement of the nomination of a Plankton Assistant for one year will not be too serious a drawback.

In accordance with the recommendation of the Plankton Committee (see p. 88) and the Consultative Committee (see p. 42,10) the Council decided to postpone the question to the next meeting.

The President asked Prof. Ostenfeld, who was now present, if he agreed to the postponement. He added that the next Council meeting would very likely be already in May 1927.

Prof. Ostenfeld agreed and expressed the hope that the postponement would only be till May.

Point 12 of the Agenda (Proposal by the Bureau regarding Hydrographical Service and Appointment of a Hydrographer at the Bureau).

On consideration of the recommendation of the Consultative Committee (see p. 42,7), the President said that the General Secretary, who was not present at this meeting, was anxious that definite instructions should be laid down as to the position of the Hydrographer vis à vis the staff of the Bureau. He had not been quite satisfied with the reply offered by the Consultative Committee on that subject. He assumed that the Committee felt competent only to consider the subject of instructions from a scientific point of view, and therefore suggested that the last sentence of the Committee's recommendation should read "The Consultative Committee submits the above resolution as a reply to the General Secretary's letter in so far as scientific work is concerned". It was agreed that, in other matters, the Hydrographer must take his instructions from the General Secretary.

The President further reminded the Council that it had been decided last year to appoint a Hydrographer for one year. The Bureau had decided, in the light of what the Consultative Committee had recommended, to propose the reappointment of the present Assistant, Dr. Pettersson, for one year from the 15th Sept. with a salary of 10,000 Kr. a year. They further proposed to fix 3000 Kr. for assistance leaving it to the General Secretary to make such arrangements as he found best.

This was agreed to.

Point 13 of the Agenda (Communication by Prof. HJORT about the special Committee for a closure of the Moray Firth).

The President said that no communication had been received. Owing to difficulties caused by the general strike in England last spring, Prof. HJORT had been unable to go to Scotland. Prof. HJORT would, however, immediately after the Council Meeting, pay a visit to Scotland. He would then be prepared to discuss the question at the next Council Meeting.

The President added that the Council had to consider the election of a new member in the place of Dr. REDEKE, and asked if anyone had a name to suggest.

Mr. JONES suggested the appointment of Prof. EHRENBAUM from Hamburg. He said Professor EHRENBAUM was well informed with regard to the issues so that it would be a comparative simple matter for him to take up the subject.

Dr. HEINRICI answered that Prof. EHRENBAUM would be prepared to serve on the Committee, and he was appointed accordingly.

Prof. HJORT said that he would be very glad if he was authorised also to call M. VERBRUGGHE as an expert. He thought it very desirable to have practical as well as scientific evidence from Belgium which had been fishing so much in the Moray Firth. It was decided to appoint M. VERBRUGGHE an additional member of the Committee.

Point 14 of the Agenda (Communication about proposals regarding International Expeditions).

The President said that the Delegates were aware of the fact that on behalf of the Council he had attended the meeting of the Oceanographical Section of the International Union of Geodesy and Geophysics at Stra. The suggested International Expedition had been discussed and it had been unanimously agreed that the practical obstacles to an organised International Expedition by means of an international ship were likely to prove insurmountable. He had accordingly suggested that the purposes which the authors of the proposal had in view would be best advanced by the endeavours, through a Committee or some other means of liaison to maintain touch between the various national expeditions either now in progress or about to be equipped, particularly the "Discovery" Expedition and expeditions equipped by Germany, the U.S.A. and others. The principal points to be kept in view were:—

1) An agreement as to the subjects of universal interest to which all such expeditions should be asked to pay attention.
2) The standardisation of methods, and
3) The standardisation of apparatus.

It had been suggested that the last two points might be considered by a Committee of experts assembled in connection with the next meeting of the Inter-

national Union of Geodesy and Geophysics next year. The Secretary of the Oceanographical Section of this Union, Prof. MAGRINI, had invited the Council to send a representative and this course had been recommended by the Hydrographical Committee. The Consultative Committee had suggested that the Council should accept the invitation and that Prof. M. KNUDSEN should act as Delegate for the International Council. The Council approved the proposal to accept the invitation and to nominate Professor Knudsen.

Point 15 of the Agenda (Memorandum by Prof. HJORT with regard to Prof. O. DE BUEN's proposal for the protection of whales).

This question had been referred to the Consultative Committee which had recommended the formation of a Committee consisting of the following members from the following countries:— Prof. HJORT, Chairman, Norway; Prof. SCHMIDT, Denmark; Mr. BORLEY, England; Mr. JONES (Deputy Dr. BOWMAN), Scotland; Dr. LE DANOIS, France; Dr. FERNANDO DE BUEN, Spain; a member from Portugal. Dr. LE DANOIS and Prof. O. DE BUEN had expressed on behalf of their Governments the desire that a meeting of the Whaling Committee should be held during the winter in Paris, or in Spain (see p. 44, 14).

The President stated that the Bureau raised no objection to the payment of the travelling expenses of the members of the Committee, if appointed, for a meeting to be held in Paris. Prof. HJORT was prepared to visit Spain at his own expense and to report the result of his inquiries to the Committee in Paris.

Mr. JONES took it for granted that there would be no objection to any member of the Committee who so desired taking part in any preliminary inquiry prior to the meeting in Paris as to the conditions at the Spanish stations, provided it did not involve any expense to the Bureau. The date of the visit to Spain could be arranged beforehand by mutual correspondence.

The President said he did not see how objection could be taken to such an arrangement.

Prof. ODÓN DE BUEN agreed that there should be a meeting in Paris but expressed the hope that some of the members of the Committee would come to Spain and see the whaling stations. On behalf of his Government he offered hospitality.

M. TISSIER déclare que si ce comité est constitué, le Gouvernement français est prêt à le recevoir en lui fournissant les moyens de se réunir.

The President thanked Messrs. DE BUEN and TISSIER for the offers of hospitality made by them on behalf of their Governments.

On the question being put to the meeting it was agreed that a Whaling Committee should be appointed, that the Members of it should be those named above and that it should have the following reference:—

"To consider to what extent and by what means the International Council can contribute to the biological investigations of whales at present being conducted, and especially

those of the 'Discovery' Expedition in the South and of Dr. HJORT in the North, and to organise such contributory work as seems practicable".

Point 16 of the Agenda (Consideration of the Reports and Programmes of the Committees).

The reports and programmes having been printed and distributed and members having thus had an opportunity of reading and considering them, the President said he proposed to put their adoption to the Council taking them as read. In doing so, however, he would draw attention to the points calling for special notice and particularly to those bearing on the Budget:—

The Area Committees had not proposed to hold any meetings involving expenses, and, as it was intended to meet early next year, the Bureau hoped that there would again be no need for such meetings. The item for Travelling Expenses had, however, been left at the same figure as last year, Kr. 13,000, in order that there might be sufficient to cover all travelling expenses including those of the Whaling Committee.

Report of the Limnological Committee. Some discussion took place with regard to the proposal of the Spanish Delegates (see p. 94) that a Sub-Committee should be formed to study Salmon.

Prof. HJORT pointed out that this proposal had not been discussed by the Consultative Committee, as they had not seen the Limnological Committee's programmes and recommendations. He suggested that the proposal might be considered by a special Sub-Committee appointed to meet some days before the next Council Meeting, the members' subsistence being paid by the Council during these days. It was rather difficult to deal with this recommendation which included no definite proposal as to members etc.

Dr. LE DANOIS déclare que la question des migrations et de la biologie du saumon des rivières de Grande Bretagne, de France, d'Irlande et d'Espagne est une question qui peut relever du Comité du Plateau Continental Atlantique. Cependant, ce comité n'a pu arriver à un accord unamine sur la proposition du Professeur Roule, ainsi a-t-il jugé préférable de la passer au Comité limnologique et il demande au Conseil de soutenir cette proposition.

Prof. ODÓN DE BUEN said the question was an urgent one. The Salmon had commenced to disappear from the rivers in Spain, later from the rivers in France, and it was now clear that it was no local problem, but an international one which ought to have been studied by the Atlantic Slope Committee. The question ought to be studied as soon as possible, and could not wait till the Council Meeting in the spring, nor was it of any use to meet in Stockholm in this matter; it was important that the proposed Sub-Committee consisting of members from Great-Britain, Ireland, France and Spain should meet in Santander where Laboratories and other accomodations were available.

The President felt some doubt about the proposal to form a Committee for the purpose outside the Limnological Committee. He proposed, as an alternative for the present, that the countries concerned should take up the preliminary investigations between themselves. He would endeavour to arrange that a British expert should go to Santander to meet French and Spanish experts, and perhaps Mr. FARRAN might be able to make a similar arrangement as regards Ireland. The experts could then report to the Council at its next Meeting and the Council might, if necessary, pay their subsistence expenses at Stockholm for some few days before that meeting.

Prof. DE BUEN proposed that Prof. ROULE should be the reporter for the purpose of this meeting.

These proposals were agreed to.

Report of the Statistical Committee. The Statistical Committee having in view further improvements of the Statistical Bulletin, for the discussion of which time was not available, wished to hold a special meeting of the Committee at some convenient place and time before the next meeting of the Council. The Bureau proposed that the subsistence expenses of the members of the Statistical Committee might be paid by the Council for a few days stay in Stockholm before the Council Meeting.

This was agreed to.

M. TISSIER fait remarquer que cette rétribution pour des réunions antérieures à la réunion du Conseil ne doit pas constituer un précédent pour des arrangements analogues en toutes occasions.

The President drew attention to the recommendation of the Consultative Committee (see p. 38,2) that Chairmen of Committees should prepare short reports concerning the period between their last reports and the end of the calendar year, and that such reports should be sent to the Bureau by the 1st of March 1927. He added that this would in fact mean that the reports in future should deal with the calendar year which would be more convenient for those carrying out work at sea, and would enable full reports to be prepared of the work of the various Committees during the whole year.

The proposal was adopted.

Dr. HEINRICI, referring to the programmes and recommendations of the various Committees as a whole, stated that Germany wished to take part in the work without delay, and suggested that German participation might be arranged by correspondence between himself and the chairmen of Committees. He said that his colleagues wished to work with all the Committees except the Atlantic Slope Committee, the Whaling Committee, the Plankton and the Hydrographical Committee. It was agreed accordingly, on the suggestion of Prof. HJORT that Dr. HEINRICI should write to the General Secretary indicating the names and addresses of those of his German colleagues whom he wished to be

appointed to the different Committees; and that the General Secretary should forward the information to the Chairmen and Members of the Committees concerned.

The recommendations and programmes of the following Committees were then submitted to the Council and adopted:— North-Eastern Area Committee, North-Western Area Committee, North Sea Committee, Atlantic Slope Committee, Transition Area Committee, Baltic Committee, Limnological Committee, Hydrographical Committee and Statistical Committee.

With regard to the programme of the Plankton Committee, Prof. OSTENFELD expressed regret that the 3000 Kr. formerly put on the Budget for Plankton work had been cancelled. He urged that the Committee's recommendation as to comparative hauls with various patterns of Plankton nets might involve some expenses. He thought it would be necessary at the next meeting of the Council to make some provision on the Budget for Plankton work.

The President answered that he and his colleagues in the Bureau were under the impression that the intention was that the scientific workers should arrange these matters between themselves without expense to the Council. He would be sorry, if the work were delayed, but suggested that matters should be left as they stood. He thought it was hardly necessary to make any specific provision in the budget. Should any expenses be involved they would be of a minor character and could be met as incidental expenses of the Bureau.

Prof. HJORT suggested that Prof. OSTENFELD should work out some definite proposal and submit it to the Bureau.

Prof. OSTENFELD said that he merely wished to call the attention to the matter.

It was agreed that the question might be left for discussion at the next Council Meeting.

Editorial Committee. Prof. PETTERSSON said that the last sitting of the Editorial Committee had taken place so late that he could only lay its resolutions before the Council orally. There were two resolutions of the Committee to be considered. The first concerning the Scheme for the Council's Journal had already been dealt with under item 10 of the Agenda. With regard to the Bulletin Trimestriel the Editorial Committee had passed the following resolution:—

> "that the proposals of the Sub-Committee appointed by the Hydrographical Committee should be put into effect in Nos. 3 and 4 of 1926 and No. 1 of 1927 of the Bulletin Trimestriel, that a circular should be sent out asking for opinions on the form of the Bulletin, and that the question should be definitely decided at the meeting of the Council in May, 1927."

The President stated that all Chairmen of Committees had been re-elected by their respective Committees.

With regard to the composition of the Consultative Committee the Pre-

sident suggested some small alterations. Mr. JONES, as honorary Chairman of the swo North Sea Committees, ought, he thought, to be an ordinary member of the Consultative Committee. As Dr. REDEKE was no longer a member of the Council, his name should be removed from the list of supernumerary members of the Consultative Committee to which the President suggested that the Council should add the Chairman of the Baltic Committee and a Vice-Chairman to be elected for the Atlantic Slope Committee.

M. TISSIER propose de nommer le professeur RAFAEL DE BUEN comme vice président du Comité du Plateau Continental Atlantique avec des émoluments de de 3000 Kr. par an.

The composition of the Consultative Committee and the election of Prof. R. DE BUEN were agreed to.

Point 6 of the Agenda (Estimates).

The President, with reference to the Estimates circulated, first drew attention to the reduction, under the head of receipts, of the contributions of the Great Powers to 20,000 Kr. This reduction, which had been made possible by the re-entry of Germany, had been proposed by Dr. HJORT and heartily agreed to by the Bureau, who felt certain that it would be a matter of satisfaction to the Governments in question that the Council should of their own motion propose such a reduction. They felt, further, that the reduction might facilitate the entrance of other countries.

Assuming that this reduction was made, the Council could not quite balance the budget on revenue, but the deficit, not being a very large one, could be met out of the reserve fund until — in the near future, as the Bureau hoped — the countries at present paying reduced contributions were able to pay again in full.

It was agreed to submit this recommendation to the participating Governments for their approval.

The President then went through the expenditures item by item, indicating the increases involved by the Council's Resolutions.

Item 9 — Hydrographical Department — was raised to 13,000 Kr., 10,000 Kr. as salary to Dr. PETTERSSON who was to be appointed for one year more as Hydrographical Assistant, and 3,000 Kr. to be disposed of by the General Secretary for assistance, stationery etc. in the Hydrographical Department.

Item 13 — Chairmen of Committees — was raised by 3,000 Kr. to provide for the newly elected Vice-Chairman of the Atlantic Slope Committee.

Item 14 — Special Resolutions of the Council — was raised by 1,000 Kr. to provide for the cost of transport and other expenses incidental to the proposed experiments with Saving-gears. A further increase of this sub-head would be necessary if the Council agreed to a proposal the Bureau wished to lay before it with regard to the Belgian contribution. The following letter had been received from the Danish Foreign Office:—

Me référant a ma lettre du 31 du mois passé concernant l'adhésion renouvelée des membres du Conseil International pour l'Exploration de la Mer j'ai l'honneur de vous transmettre ci-joint copie d'une note du 28 du même mois du Ministre des Affaires Etrangères belge à la Légation Royale à Bruxelles.

Il en ressort que la Belgique est prête à participer pour une nouvelle période de cinq ans aux travaux de l'exploration internationale de la mer pourvu qu'elle soit, à titre transitoire, autorisée à n'acquitter en guise de cotisation qu'une somme fixée en francs belges équivalente à celle que représentait la contrevaleur de 5,000 couronnes lorsqu'ont été établies les prévisions budgétaires, soit la somme de 20,000 francs.

The President added that he had been privately informed by Professor GILSON that there was danger that if Belgium were required to pay the present contribution of 5,000 Kr. he might be deprived of the means for carrying on his work owing to the difficulties involved. In this connection, the Council would have regard to the resolution of the Southern North Sea Committee and the recommendation thereon of the Consultative Committee (see pages 64 and 42, 11).

The Bureau considered it undesirable in principle to ask the participating Governments to agree to a further reduction of the Belgian contribution. He (the President) had accordingly suggested that the Council should not recommend a reduction but that they should inform the Belgian Government that in consideration of their payment of 5,000 Kr. for the current year the Council would be prepared to contribute for this year the sum of 2,500 Kr. for the maintenance of the Belgian research ship "Oithona" and for the investigations conducted by Professor GILSON. The President pointed out that the Council was free thus to dispose of its funds without reference to the participating Governments. The Bureau endorsed this proposal and recommended it to the Council. The proposal was adopted.

Professor GILSON said that he was unaware that the Belgian Government had actually written to the Council applying for a further reduction of the contribution, though he had understood that such action was contemplated. He wished personally to express his heartfelt thanks to the Council for their offer of a solution of the difficulty, which would enable him to continue his work.

With regard to the grant of 1,000 Kr. which had been made annually for the past three years to Mrs. GEHRKE, the President said that the Bureau understood that her financial circumstances had improved, it was accordingly not proposed to continue the grant after the current financial year.

The Estimates were approved by the Council.

Point 17 of the Agenda (Nomination of members of the Bureau, the Finance Committee, the Editorial Committee and the Editors).

Prof. O. DE BUEN proposed that the members of the Bureau should be re-elected. Dr. EKMAN seconded this proposal which was passed by acclamation.

The President briefly thanked the Council for the renewal of their confidence in the members of the Bureau.

On the proposal of the President the following members were elected as members of the Finance Committee:—

The President,
Mr. G. P. Farran,
- S. K. Asserson,
Dr. J. J. Tesch,
- Heinrici.

The present members of the Editorial Committee,
Prof. Pettersson, Chairman,
— G. Gilson,
— D'Arcy Thompson,
— Martin Knudsen,
— L. Joubin,
Dr. E. S. Russell, and
The General Secretary

were re-elected and it was agreed that in case Prof. Joubin did not take part in the meetings he should be substituted by Dr. le Danois. It was further agreed to elect Prof. Mielck a member of the Editorial Committee.

Prof. Hjort was re-elected Chairman of the Consultative Committee.

The Editor for Statistics, Prof. D'Arcy Thompson, the Editor of the Journal, Dr. E. S. Russell and the Chairman of the Editorial Committee, Prof. O. Pettersson were also re-elected.

M. Tissier propose un vote de remerciements au Prof. Hjort pour l'exellent travail qu'il a effectué dans un minimum de temps en qualité de Président du Comité Consultatif.

The vote was heartily accorded.

Point 18 of the Agenda (Time and Place for the next Council Meeting).

Professor Pettersson on behalf of his Government formally invited the Council to meet next year at Stockholm to celebrate its 25th Anniversary.

The President said that the Swedish Government had suggested that the meeting should take place either in the middle of May or at the beginning of September. The result of the vote which had been taken by members of the Council and of the Consultative Committee was strongly in favour of a May meeting. The date would be fixed later by the Bureau. He asked Professor Pettersson to convey to his Government the Council's thanks for the invitation and their cordial acceptance of it.

Point 19 of the Agenda (Other business).

The President stated that Professor Magrini had laid before the Consultative Committee the following proposal:—

"On propose de nommer un ou deux délégués pour fixer, d'accord avec la Section Internationale d'Océanographie du Conseil International des Recherches, le programme de

la publication rationale, par volumes annuels, de la Bibliographie Générale de l'Océanographie".

The Committee had unanimously agreed to recommend the nomination of Dr. RUSSELL and Prof. M. KNUDSEN as Delegates for the International Council.

This was agreed to.

Point 20 of the Agenda (Conclusion of the meeting).

The President proposed a vote of thanks to the General Secretary for his work for the Council and in particular for the arrangements made by him for the comfort of members in the course of the present meeting. He knew that the Council would wish to associate themselves with him in expressing their deep regret that the state of the General Secretary's health prevented him from being present at their concluding meeting, and that they would wish to convey their sympathy to him and their best wishes for his speedy recovery.

The vote was passed with acclamation.

The President further proposed a vote of thanks to the Danish Ministry of Agriculture for their hospitality to the Council in the Luncheon intervals.

This vote was heartily accorded.

Finally, on the proposal of the President, a hearty vote of thanks was accorded to the staff of the Bureau for their assistance in the Council's work, particularly in connection with the present meeting.

The Meeting then terminated.

ESTIMATE

of

the International Council for the Study of the Sea for the financial year 1926—27

Receipts:-

Head	No.	Item	Kroner	Kroner
				*)
I	1	**Balance** on the 21st July 1926		177,687,17
II		**Annual Contributions** of the Governments for 1926-27:-		
	2	Belgium	5,000,00	
	3	Great Britain	20,000,00	
	4	Denmark	10,000,00	
	5	Finland	5,000,00	
	6	France	20,000,00	
	7	Germany	20,000,00	
	8	Ireland	10,000,00	
	9	Netherlands	10,000,00	
	10	Norway	10,000,00	
	11	Poland	5,000,00	
	12	Portugal for 1925-26 and 1926-27	10,000,00	
	13	Spain	20,000,00	
	14	Sweden	10,000,00	
	15	Latvia	2,000,00	
			157,000,00	
III	16	**Interests** ..... estimated	4,000,00	
IV	17	**Sale of publications** ..... estimated	400,00	
				161,400,00
		Total Receipts...		339,087,17

*) **Balance:-**

Kr. 49,069,02 Danish Treasury Bills
„ 128,618,15 Cash & deposited in the Handelsbank.

Kr. 177,687,17

Expenditures:-

Head	No.	Item	Kroner	Kroner
I		**Incidental expenses:-**		
	1	President	6,000,00	
	2	General Secretary	15,000,00	
	3	Chairman of the Editorial Committee	2,000,00	
	4	Hydrographical Consultant	3,000,00	
	5	Editor for Statistics	2,000,00	
	6	Editor of the Journal	3,000,00	
				31,000,00
II		**Assistance:-**		
	7	1st Assistant Secretary	6,000,00	
	8	2nd Assistant Secretary	3,500,00	
	9	Hydrographical Department	13,000,00	
	10	Statistical Department	9,750,00	
				32,250,00
		carried forward...		63,250,00

Head	No.	Item	Kroner	Kroner
		Brought forward...		63,250,00
III	11	**Expenses of the office in Copenhagen:-** Rent, service, heating, stationery, books, binding of books, light, gas, telephone, telegrams, insurance, postage, freights, typewriting and other expenses (cataloguing of library) ..	15,000,00	15,000,00
IV	12	**Travelling expenses**	13,000,00	13,000,00
V	13	**Chairmen of Committees**	24,000,00	24,000,00
VI	14	**Special Resolutions** of the Council	7,500,00	7,500,00
VII	15	**Printing and distribution**	40,000,00	40,000,00
		Total expenditures...		162,750,00

Remarks to Estimate (1926—27)

Item 9 is raised to 13,000 Kr. of which sum 10,000 Kr. is suggested as the salary of a permanent hydrographer and 3,000 Kr. for assistance with proof reading, type-writing, stationery etc. for the Hydrographical Department.

Item 11 is raised from 14,800 Kr. to 15,000 Kr. During the last two years of the 14,800 Kr. 800 Kr. has been put on the estimates for book-binding which has been neglected during the war. These 800 Kr. are now suggested for cataloguing of the library and 200 Kr. for book-binding.

Item 14. This item includes 1,000 Kr. to Mrs. Gehrke, 3,000 Kr. for Dr. Redeke's Report, 1,000 Kr. for experiments with saving gear and 2,500 Kr. to Prof. Gilson's investigations.

Special reserve for pensions.

Cash in hand at 22. July 1926 ..... Kr. 2,639,72
Interests from Treasury Bills falling due in 1926—27 ..... Kr. 2,580,00

Kr. 5,219,72

List of Members of Committees.

Consultative Committee.

Professor Johan Hjort, chairman,
Mr. J. O. Borley,
Dr. A. Bowman,
Dr. Ed. le Danois,
Dr. A. C. Johansen,
Mr. David T. Jones,
Professor Martin Knudsen,
Dr. E. S. Russell,
Professor Johs. Schmidt.

Supernumerary members:—

Dr. K. A. Andersson,
Professor D'Arcy W. Thompson,
Professor Rafael de Buen,
Professor C. H. Ostenfeld.

North Eastern Area Committee.

Norway:	Professor Johan Hjort, chairman,
	Mr. S. K. Asserson,
Denmark:	Professor Johs. Schmidt,
England:	Dr. E. S. Russell,
France:	Commandant Charcot,
	failing him Dr. Ed. le Danois,
Germany:	Professor W. Mielck,
Scotland:	Dr. R. S. Clark,
Sweden:	Dr. K. A. Andersson,
	Dr. G. Ekman.

North Western Area Committee.

Denmark:	Professor Johs. Schmidt, chairman,
England:	Dr. E. S. Russell,
France:	Dr. Ed. le Danois,
Germany:	Professor E. Ehrenbaum,
Norway:	Mr. Oscar Sund,
Scotland:	Dr. A. Bowman.

Combined North Sea Committee.

Mr. David T. Jones, chairman.

Northern North Sea Committee.

Scotland:	Dr. A. Bowman, chairman,
Denmark:	Professor Johs. Schmidt,
England:	Mr. J. O. Borley,
France:	M. le Gall,
Germany:	Professor E. Ehrenbaum.
Holland:	Dr. J. J. Tesch,
Norway:	Mr. Oscar Sund,
Sweden:	Professor O. Pettersson,
	Dr. A. R. Molander.

Southern North Sea Committee.

England:	Mr. J. O. Borley, chairman,
Belgium:	Professor G. Gilson,
Denmark:	Dr. A. C. Johansen,
France:	Dr. Ed. le Danois,
Germany:	Professor W. Mielck.
Holland:	Professor E. van Everdingen,
	Dr. J. J. Tesch,
Norway:	Mr. Paul Bjerkan,
Scotland:	Dr. A. Bowman,
Sweden:	Dr. K. A. Andersson.

Transition Area Committee.

Denmark:	Dr. A. C. Johansen, chairman,
	Professor Martin Knudsen,
Germany:	Dr. Strodtmann,
Norway:	Mr. Paul Bjerkan,
Sweden:	Professor O. Pettersson,
	Dr. K. A. Andersson.

Baltic Area Committee.

Sweden:	Dr. K. A. Andersson, chairman,
	Dr. H. Pettersson,
Denmark:	Dr. A. C. Johansen,
	Professor Martin Knudsen,
Finland:	Professor R. Witting,
	Professor T. H. Järvi,
Germany:	Professor H. Henking,
Latvia:	Mr. V. Miezis,
Poland:	Professor M. Siedlecki,
	Professor J. Smolenski.

Atlantic Slope Committee.

France:	Dr. Ed. le Danois, chairman,
Spain:	Professor Rafael de Buen, vice-chairman,
	Professor José Giral.
England:	Dr. E. J. Allen,
	Dr. E. S. Russell,
France:	Professor L. Joubin,
	Professor L. Roule,
Germany:	Professor G. Schott,
Irish Free State:	Mr. G. P. Farran,
Portugal:	

Hydrographical Committee.

Denmark:	Professor Martin Knudsen, chairman,
Belgium:	Professor G. Gilson,
England:	Mr. J. O. Borley,
Finland:	Professor R. Witting,
France:	Dr. Ed. le Danois,
Germany:	Professor G. Schott,
Holland:	Professor E. van Everdingen,
Irish Free State:	Mr. G. P. Farran,
Latvia:	Mr. V. Miezis,
Norway:	Mr. Oscar Sund,
Poland:	Professor M. Siedlecki,
Spain:	M. Léon Herrero,
	Professor José Giral,
	failing them Professor Rafael de Buen,
Scotland:	Professor D'Arcy W. Thompson,
Sweden:	Professor O. Pettersson.

Plankton Committee.

Denmark:	Professor C. H. Ostenfeld, honorary chairman,
Belgium:	Professor G. Gilson,
Germany:	Professor K. Brandt,
Holland:	Dr. J. J. Tesch,
Irish Free State:	Mr. G. P. Farran,
Latvia:	Mr. V. Miezis,
Norway:	Mr. Paul Bjerkan,
	Professor H. H. Gran,
Poland:	Dr. A. Litynski,

Scotland:	Dr. R. S. Clark,
Spain:	Dr. Juan Cuesta Urcelay,
Sweden:	Dr. K. A. Andersson.

Statistical Committee.

Scotland:	Professor D'Arcy W. Thompson, chairman,
	Mr. David T. Jones,
Belgium:	Professor G. Gilson,
England:	Dr. E. S. Russell,
Finland:	Professor T. H. Järvi,
France:	M. G. Lecourbe,
Germany:	Professor H. Henking,
Holland:	Dr. J. J. Tesch,
Irish Free State:	Mr. C. Green,
Latvia:	Mr. V. Miezis,
Norway:	Mr. S. K. Asserson,
Poland:	Mr. J. Borowik,
Spain:	Captain Sebastian Noval,
	Dr. Fernando de Buen,
Sweden:	Dr. K. A. Andersson.

Limnological Committee.

Sweden:	Dr. K. A. Andersson, temporary chairman,
Denmark:	Dr. A. C. Johansen,
England:	Dr. E. S. Russell,
Finland:	Professor T. H. Järvi,
France:	Professor L. Roule,
Germany:	Professor H. Henking,
Irish Free State:	Mr. R. Southern,
Poland:	Professor M. Siedlecki,
	Dr. F. E. Lubecki,
Spain:	Dr. Fernando de Buen.

Editorial Committee.

Professor O. Pettersson, chairman,
Professor D'Arcy W. Thompson,
Professor G. Gilson,
Professor L. Joubin,
failing him Dr. Ed. le Danois,
Professor Martin Knudsen,

Professor W. Mielck,
Dr. E. S. Russell,
The General Secretary.

Finance Committee.

The President,
Mr. G. P. Farran,
Mr. S. K. Asserson,
Dr. J. J. Tesch,
Dr. Heinrici.

Special Committees.

Moray Firth Committee.

Professor Johan Hjort, chairman,
Dr. A. Bowman,
Professor E. Ehrenbaum,
Professor G. Gilson,
Dr. E. S. Russell,
Professor Johs. Schmidt,
M. Léon Verbrugghe.

Whaling Committee.

Professor Johan Hjort, chairman,
Mr. J. O. Borley,
Dr. Fernando de Buen,
Dr. Ed. le Danois,
Mr. David T. Jones,
Deputy Dr. A. Bowman,
Professor Johs. Schmidt,
a member from Portugal not yet appointed.

Recommendations of the Consultative Committee.

Chairman: Prof. JOHAN HJORT.
Meetings held on Sept. 1st, 2nd & 7th.

1) Reports of Chairmen of Area Committees.

The Committee recommends that the reports from Chairmen of Area Committees should be mainly of an administrative character, dealing with work accomplished, work in progress, and proposals for further investigations. Appendices dealing with special scientific questions should not as a rule accompany the Administrative Reports, but should find a place in the "Journal du Conseil".[1])

2) Period covered by Area Reports.

The Committee recommends in the interests of the work, which is carried out predominantly in the summer months, that the Area Reports should relate to the investigations made during the calendar year, and should be presented to a meeting of the Council in the following spring.

The Committee recommends that Chairmen of Committees should prepare short reports concerning the period between their last reports and the end of the calendar year, and that such reports should be sent to the Bureau by the 1st March, 1927.

3) Area Programmes.

The Committee considers that a satisfactory execution of the investigations carried out by the Council requires that each of the investigators shall be properly informed as to the researches in progress and about to be undertaken, and the parts of each investigation undertaken by the various participating countries during the coming year; they therefore request the Area Committees to prepare definite programmes for the coming year, distinguishing the parts to be undertaken respectively by the various countries represented upon them, and the Chairmen of these Committees to submit these programmes to the Consultative Committee.

4) Distribution of Programmes.

The Committee recommends that arrangements be made for the issue of reprints of the combined programmes as ultimately approved, for distribution to all workers of the International Council.

[1]) This recommendation refers to scientific notes arising out of current investigations, not to such reports as are ordinarily published in the series "Rapports et Procès-Verbaux".

Recommandations du Comité Consultatif.

Président: le Prof. Johan Hjort.
Réunions des 1, 2 et 7 Septembre 1926.

1) Rapports des Présidents des Comités des Secteurs.

Le Comité recommande que les rapports des Présidents des Comités des secteurs soient d'un caractère surtout administratif, et qu'ils traitent du travail accompli, du travail en cours et des propositions pour des investigations ultérieures. En règle générale, des appendices traitant des questions scientifiques spéciales ne devront pas accompagner les rapports administratifs mais devront trouver place dans le "Journal du Conseil".[1])

2) Période à laquelle s'appliquent les Rapports des Secteurs.

Le Comité recommande, dans l'intérêt du travail, qui s'accomplit principalement pendant les mois d'été, que les rapports des secteurs aient trait aux investigations faites pendant l'année courante et soient présentés à une réunion du Conseil au printemps suivant.

Le Comité recommande que les Présidents des Comités préparent de courts rapports concernant la période comprise entre leurs derniers rapports et la fin de l'année courante et que ces rapports soient envoyés au Bureau pour le 1 Mars 1927.

3) Programmes des Secteurs.

Le Comité estime qu'il est exigé pour la bonne éxécution des investigations conduites par le Conseil, que chacun des investigateurs soit bien informé du sujet des recherches en cours ou en voie d'être entreprises, ainsi qu'au sujet des parties de chaque investigation dont les divers Pays participants se chargeront au cours de l'année suivante; il demande donc aux Comités des secteurs de préparer des programmes définis pour l'année suivante, en distinguant la part prise respectivement par les divers Pays représentés, et prie les Présidents de ces Comités de soumettre ces programmes au Comité consultatif.

4) Distribution des Programmes.

Le Comité recommande que des dispositions soient prises pour la publication des programmes combinés définitivement approuvés, pour être distribués à tous les travailleurs du Conseil International.

[1]) Cette recommendation se rapporte aux notes scientifiques ayant trait aux investigations en cours d'execution, et non pas aux rapports qui seront publiés dans la serie "Rapports & Procès-Verbaux".

5) Description of New Gear.

The Committee recommends that a complete description of any new gear utilised in the International Investigations should be deposited with the Bureau, and the deposit notified in the "Journal du Conseil", copies of such descriptions to be distributed as required.

6) Biological Statistics.

The Committee recommends that publication of biological material indicative of the composition of the stock of the most important fish with regard to size and age should be made in a tentative way, and that such information be published as quickly as circumstances allow in the Journal under a special heading.

7) Quarterly Hydrographical Bulletin.

The Committee agrees that the Quarterly Bulletins serve a useful purpose for biological and fishery work, at least in the North Sea.

They recommend that, by way of experiment and for one year only, the Bulletin should be published in two forms, one placing only the recorded observational data on the chart, the other giving graphic representations thereof in the the form of isohaline and isothermal curves.

With regard to the Atlantic Ocean, the Committee is of opinion that no need exists for speedy publication of results.

The Committee is further of opinion that the preparation by the Hydrographer from time to time of general summaries of the hydrographical work might be useful; but that they should be prepared only in response to resolutions of the Council.

The Committee submits the above resolutions as a reply to the General Secretary's letter of the 22nd April, 1926, in so far as scientific work is concerned.

8) Statistics.

The Committee requests the Statistical Committee to consider all practicable methods of achieving rapid publication of statistical data relating to the fisheries of Northern Europe.

On consideration of the Report of the Statistical Committee, the Consultative Committee recommends that a special meeting of the Statistical Committee should be held at some convenient place and time before the next meeting of the Council to consider the revision of the whole form of the Bulletin and the tables contained therein, with a view to more speedy publication, as requested by the Consultative Committee, and more economical publication, as requested by the Bureau.

5) Description des nouveaux Engins.

Le Comité recommande qu'une description complète de tout nouvel engin employé pour les investigations internationales soit déposée au Bureau et que ce dépot soit notifié dans le "Journal du Conseil"; des copies de ces descriptions pourraient être distribuées si on le désire.

6) Statistiques de Biologie.

Le Comité recommande que l'on tente à titre d'expérience la publication de matériaux de Biologie indicatifs de la composition, au point de vue de la taille et de l'âge, des stocks des poissons les plus importants, et que cette information soit publiée dans le Journal, aussi rapidement que les circonstances le permettront, sous un titre spécial.

7) Bulletin Hydrographique Trimestriel.

Le Comité est d'avis que les Bulletins Trimestriels ont leur utilité pour le travail biologique et pour le travail de pêcherie, au moins dans la Mer du Nord.

Il recommande qu'à titre d'expérience, et seulement pour une année, le Bulletin soit publié sous deux formes: l'une pointant simplement les données d'observation sur des cartes, l'autre en donnant des représentations graphiques sous la forme de courbes isohalines et isothermes.

Au sujet de l'Océan Atlantique, le Comité est d'avis qu'une publication rapide n'est pas nécessaire.

Le Comité est d'avis, en outre, que la préparation par l'hydrographe de sommaires généraux du travail hydrographique pourra être utile, de temps en temps, mais que ces sommaires ne devront être preparés qu'en réponse à des résolutions du Conseil.

Le Comité consultatif présente les résolutions ci-dessus en réponse à la lettre du Secrétaire Général, du 22 avril 1926, en ce qui concerne le travail scientifique.

8) Statistique.

Le Comité demande au Comité statistique d'examiner toutes les méthodes pratiques pour arriver à la publication rapide des données statistiques relatives aux Pêcheries du Nord de l'Europe.

En se référant au rapport du Comité statistique, le Comité consultatif recommande qu'une réunion spéciale du Comité statistique ait lieu en un endroit et à une époque appropriés, avant la prochaine réunion du Conseil, pour mettre à l'étude la révision dans son ensemble de la forme du Bulletin — et des tables annexes — en prévision d'une publication plus prompte — comme demandé par le Comité consultatif — et plus économique — comme demandé par le Bureau.

9) Saving Gear.

The Committee, being of opinion that the development of an effective saving-trawl is a matter of great importance, recommends that further experiments should be carried out in the Baltic Area, the Transition Area and the North Sea Area, with both the English and the Swedish forms of saving-trawl, and that reports on the results should be prepared in good time for discussion at the next convenient meeting of the Committee. To this end it recommends that an exchange of the different types of saving-gear should take place between the laboratories at Lowestoft, Aberdeen, Heligoland and Gothenburg, in order to test the efficiency of such inventions, and that the incidental expenses should be borne by the Bureau.

10) Plankton.

The Committee recommends that consideration of Prof. Ostenfeld's proposal regarding a Plankton Assistant be postponed till next year's meeting.

11) Work of Professor Gilson.

The Committee supports the resolution of the Southern North Sea Committee regarding the work of Professor Gilson, and requests the Council to consider representing to the Belgian Government the great desirability of its continuance.

12) Standardisation of methods and instruments of Research.

At the Hydrographical Committee, Prof. Magrini, Secretary of the Oceanographical Section of the International Union for Geodesy and Geophysics, laid before the Committee an invitation addressed to the President of the Council concerning participation in the work of standardising of methods and instruments by nominating technical experts to attend a meeting in Prague next year. At the suggestion of the Chairman, the Committee decided to recommend that the Council should accept the invitation, and that Professor M. Knudsen should act as Delegate for the International Council.

13) Bibliography of Oceanography.

The Committee recommends the Council to adopt the proposal of Professor Magrini that one or two Delegates should be appointed to agree with the Oceanographical Section of the International Research Council upon a programme for the publication in annual volumes of a general bibliography of oceanography. The Committee further suggests that Prof. M. Knudsen and Dr. Russell should be nominated as Delegates to represent the International Council.

9) Chalut Épargneur.

Le Comité étant d'avis que l'invention d'un "chalut épargneur" est une question de grande importance, recommande que de nouvelles expériences soient faites dans le Secteur baltique, dans le Secteur de transition et dans le Secteur de la Mer du Nord, à la fois avec la forme anglaise et la forme suédoise du filet épargneur, et que des rapports sur les résultats soient élaborés à temps pour être discutés à la première réunion opportune du Comité. A cette fin il recommande qu'un échange des différents types de filet épargneur se fasse entre les Laboratoires de Lowestoft, Aberdeen, Helgoland et Gothenbourg, en vue de contrôler l'efficacité de ces inventions, et que les dépenses occasionnées soient supportées par le Bureau.

10) Plancton.

Le Comité recommande que l'étude de la proposition du Professeur Ostenfeld relative à l'adjoint planctoniste soit différée jusqu'à la réunion de l'année prochaine.

11) Travail accompli par le Professeur Gilson.

Le Comité soutient la résolution du Comité du Sud de la Mer du Nord relative au travail accompli par le Prof. Gilson et demande au Conseil d'examiner la question de faire remarquer au Gouvernement Belge l'importance de sa continuation.

12) Standardisation des méthodes et des instruments de Recherche.

Le Professeur Magrini, Secrétaire de la Section océanographique de l'Union Internationale de Géodésie et Géophysique a soumis au Comité hydrographique une invitation, adressée au Président du Conseil, à l'effet de participer au travail de standardisation des méthodes et des instruments, par la nomination d'experts techniques qui assisteront à la réunion de Prague l'année prochaine. A la suggestion du Président, le Comité décide de recommander que le Conseil accepte l'invitation et que le Professeur M. Knudsen soit désigné comme délégué du Conseil International.

13) Bibliographie de l'Océanographie.

Le Comité recommande que le Conseil adopte la proposition du Professeur Magrini selon laquelle il serait nommé un ou deux délégués pour fixer, d'accord avec la Section Internationale d'Océanographie du Conseil International des Recherches, le programme de la publication, par volumes annuels, de la Bibliographie générale de l'océanographie. Le Comité recommande, en outre, que le Professeur M. Knudsen et le Docteur E. S. Russell soient délégués comme représentants du Conseil International.

14) Whaling Committee.

On consideration of the proposal submitted last year by Professor Odón de Buen that a special Committee should be appointed to study the problem of the protection of whales and the greater cetaceans, the Committee recommends that a Committee should be formed, consisting of the following delegates representing the countries named:— Norway: Prof. Hjort; Denmark: Prof. Schmidt; England: Mr. Borley; Scotland: Mr. Jones (Deputy, Dr. Bowman); France: Dr. le Danois; Spain: Dr. Fernando de Buen; Portugal: , that Prof. Hjort should be the Chairman and that a meeting should be held during the winter in Paris or Spain.

Appendix.

Proposals referred by the Bureau to the Consultative Committee.

Proposal regarding Saving Trawls.

To

The Central Bureau of the International Council.

On demand of the Transition Area Committee I beg to submit to the Central Bureau to occasion an international investigation as to the question whether it is desirable to substitute the ordinary otter-trawl with a modified otter-trawl which is saving a greater proportion of the small fish than the usual otter-trawls, and whether any of the trials made hitherto regarding the construction of special saving-trawls has been successful.

(Signed) A. C. Johansen,
Chairman for the Transition Area Committee.

Plankton Proposal.

To

The Bureau of the International Council for the Exploration of the Sea.

At the meeting of the International Council in September 1925 I had the honour to lay before the Plankton Committee a proposal concerning the manner of working out the plankton investigations in future. This proposal was on my own recommendation temporarily withdrawn owing to the new Scheme of Reorganisation of the Council's work. In particular the question of a Plankton Assistant at the Bureau was postponed to the next annual meeting of the Council (1926).

14) Comité de la Baleine.

En donnant suite à la proposition faite l'anné dernière par le Professeur Odón de Buen comportant la nomination d'un Comité spécial pour l'étude du problème de la conservation de la Baleine ainsi que des grands cétacés, le Comité recommande la constitution d'un Comité comprenant les délégués suivants, comme représentants des pays désignés ci-après: Norvège: le Prof. Hjort; Danemark: le Prof. Schmidt; Angleterre: M. Borley; Écosse: M. Jones: (député, Dr. Bowman); France: Dr. le Danois; Espagne: Dr. Fernando de Buen; Portugal: . La présidence serait conféré au Professeur Hjort et une séance se tiendrait, l'hiver prochain, à Paris ou en Espagne.

Appendice.

Projets remis au Comité Consultatif par le Bureau.

Projet concernant le chalut épargneur.

Au

Bureau Central du Conseil International.

A la demande du Comité du Secteur de transition, je me permets de suggérer au Bureau Central de provoquer une enquête internationale sur la question à savoir, s'il serait désirable de remplacer le chalut à plateaux ordinaire par un chalut à plateaux modifié, permettant l'échappement d'une plus grande proportion de petits poissons, que cela n'est possible avec le chalut à plateaux généralement en usage et, à l'effet, en second lieu, d'apprendre si les essais effectués jusqu'ici par rapport à la construction d'un chalut épargneur spécial, ont eu du succès.

(signé) A. C. Johansen
Président du Comité du Secteur de transition.

Projet concernant le Plancton.

Au

Bureau du Conseil International pour l'exploration de la mer.

Lors de la réunion du Conseil International, au mois de septembre 1925, j'ai eu l'honneur de présenter au Comité du Plancton un projet concernant le mode futur de travail dans les recherches du Plancton. Cependant, ce projet fut retiré temporairement, à ma propre recommendation, en raison du nouveau plan de réorganisation du travail du Conseil. La question relative à la nomination d'un adjoint planctoniste au Bureau avait, notamment, été renvoyée à la prochaine réunion annuelle du Conseil (1926).

As the results of the new scheme for work cannot be realised before the meeting in the coming autumn I find it difficult to ask for a final decision on my proposal so soon. I shall therefore recommend the Bureau to send copies of my proposal (Proc.Verb., Vol. XXXVIII, pp. 50—55) to the different members of the new Plankton Committee asking each of them to study it and to be ready to give their opinion on it at the coming meeting. In that manner it will better be possible to form an idea about the opinions held concerning the question, and a postponement of the nomination of a Plankton Assistant for one year will not be too serious a drawback.

(Signed) C. H. Ostenfeld,
Honorary chairman of the
Plankton Committee.

Copenhagen, 21. April 1926.

Proposal.

Instruction for the Hydrographer of the International Council for the Exploration of the Sea.

He should:

1) keep in constant personal touch, by correspondence and otherwise, with the hydrographers of the different countries who work under the international scheme, and make himself fully acquainted with the investigations they have in progress and the results they have obtained.
2) take care of the annual Bulletin Hydrographique and its publication.
3) receive quarterly hydrographic reports from the various areas and communicate to the various quarters concerned all figures or details differing essentially from the ordinary or normal hydrographic conditions.
4) communicate to the quarters concerned when the various research ships have started on their cruises, where they are to carry out investigations and the object of these investigations.
5) take care of the publication of all hydrographical publications published by the Bureau.
6) assist the Bureau in all sort of hydrographical questions and problems.
7) prepare from time to time reports on the general hydrography of the area studied by the Council.

(Signed) C. F. Drechsel.

Copenhagen, 22. April 1926.

Vu que les résultats du nouveau plan de travail ne pourront se manifester avant l'automne prochain, il me paraît difficile de demander, d'ores et déjà, une décision finale au sujet de ma proposition. Dans ces conditions, je recommande au Bureau de vouloir bien envoyer copie de mon projet (Proc. Verb. Vol. XXXVIII, pp. 50—55) aux différents membres du nouveau Comité du Plancton en leur demandant de l'examiner et de prendre les dispositions voulues pour pouvoir faire connaître leur opinion à la prochaine réunion. En procédant de la sorte, il y aura une plus grande possibilité de pouvoir se faire une idée des différentes opinions sur la question et, d'autre part, l'ajournement à une année, de la nomination d'un adjoint planctoniste, pourra se faire sans créer de sérieux inconvénients.

(signé) C. H. Ostenfeld,
Président honoraire du
Comité du Plancton.

Copenhague, le 21 Avril 1926.

Projet.

Instructions à l'usage de l'hydrographe du Conseil International pour l'exploration de la mer.

L'hydrographe doit:

1) se trouver en relation personnelle constante, par correspondance ou autrement, avec les hydrographes des autres pays travaillant suivant le plan international et il doit s'initier pleinement aux recherches entreprises par ceux-ci, ainsi qu'aux résultats qu'ont donnés ces recherches.
2) prendre soin de la rédaction du Bulletin Hydrographique annuel.
3) recevoir les rapports hydrographiques trimestriels des différents secteurs et communiquer aux différents milieux tous chiffres ou détails qui différeraient essentiellement des conditions hydrographiques ordinaires ou normales.
4) informer les milieux, que cela concerne, du départ des différents navires de recherche pour leur croisière respective, ainsi que du lieu et de l'objet de leurs recherches.
5) prendre soin de la rédaction de toutes les publications hydrographiques que fait paraître le Bureau.
6) assister le Bureau pour toutes sortes de questions et de problèmes d'ordre hydrographique.
7) préparer de temps à autre des rapports sur l'hydrographie générale des aires étudiées par le Conseil.

(signé) C. F. Drechsel.

Copenhague, le 22 avril 1926.

Programmes and Reports of Area Committees.

North Eastern Area Committee.

Meeting at 4,50, 3rd sept. 1926.
Chairman: Professor Dr. JOHAN HJORT.

The chairman asked for the cooperation of Scotland and Denmark in the work he had personally begun in conjunction with the Norwegian Fishery Bureau on the occurrence and quantity of plankton animals in relation to the migration of herrings.

The chairman also suggested to the Norwegian director of Fisheries to ask for funds to make a search for the summer habitats of the Norwegian Sea herrings.

The chairman summed up the main objects of work for the Committee in the following manner:—

1) Collection of biological statistics concerning the cod, the herring and the plaice.
2) Hydrographical observations in connection with Fishery problems.
3) Investigation of principal plankton animals:—
   a) copepods,
   b) euphausiids.
4) Special problems connected with the Barents Sea fisheries.

The work to be undertaken under these headings by the different countries will be the following:—

1) **Scotland** will as far as possible combine with Fisheries Investigations in the Northern North Sea Investigations on the Northern slope of the North Sea and on the edge of the Norwegian Deep in accordance with the main programmes of the Committee.

Norway will continue the work done on cod and herring approximately on the same plan and scale as before (see Report of Administration pp. 125 and 136) and will start collecting data on the plaice.

Programmes et Rapports des Comités des Secteurs.

Comité du Secteur Nord-Est.

Réunion à 4,50 h. le 3 Septembre 1926.
Président: le Prof. JOHAN HJORT.

Le Président demande la coopération de l'Écosse et du Danemark dans le travail qu'il a personnellement entrepris en collaboration avec le Bureau de la Pêche de Norvège, sur la présence de l'abondance des animaux du plancton et leur rapport avec la migration des harengs.

Le Président suggère aussi au Directeur des Pêcheries de Norvège de demander des fonds pour faire une recherche sur les habitats d'été des harengs de la Mer de Norvège.

Le Président résume comme suit les principaux objets de travail pour le Comité:

1) Collection de statistiques biologiques concernant la Morue, le Hareng et la Plie.
2) Observations hydrographiques en rapport avec des problèmes de pêcherie.
3) Investigations sur les principaux animaux planctoniques:
   a) copépodes,
   b) euphausides.
4) Problèmes spéciaux en connection avec la pêcherie de la Mer de Barents.

Le travail à entreprendre sous ces différents titres par les divers pays se distribue comme suit:

1) **L'Écosse** combinera autant que possible son travail avec ses investigations de pêcheries dans le Nord de la Mer du Nord des recherches sur le talus nord de cette mer, et sur le bord du grand fond de Norvège conformément aux programmes principaux du Comité.

La Norvège continuera le travail sur la morue et sur le hareng à peu près sur le même plan et sur la même échelle que précédemment (Voir le rapport administratif pp. 125 et 136) et entreprendra la réunion de données concernant la plie.

2) **Norway** will continue hydrographical investigations on the principal fishing grounds in winter and spring through Professor HJORT and the Director of Fisheries according to a similar plan as that worked last year (see p. 108 of the Report of Administration).

3) **Norway** will continue these investigations through Professor HJORT and the Director of Fisheries.

4) **England** is willing to assist in providing facilities for accommodating a Norwegian observer onboard a British trawler working in the Barents Sea, and possibly to undertake measuring a certain amount of fish (cod, haddock, plaice) brought to British ports from the Barents Sea.

Scotland is willing to serve the Committee in the same manner and in addition possibly to send a scientific observer in a commercial trawler to make measurements and other observations in the Barents Sea.

Professor HJORT was re-elected as Chairman to the Committee.

North Western Area Committee.

Chairman: Prof. JOHS. SCHMIDT.
The Committee met at 3 p. m. on 4th September 1926.

The Chairman welcomed Mr. OSCAR SUND on his first attendance as a member of the Committee.

The Administrative Report for the year was received and approved by the Committee.

The Chairman gave a short account of the work accomplished on the cruise of the "Dana" from mid. May to mid. August at Iceland and Faroe, and of the work within the area by the other participating countries, (see Administrative Report for 1925—1926 pp. 143—150).

The Chairman further described briefly the progress of the racial investigations on the Cod of the North Atlantic. He showed that the number of vertebrae is highest in the Greenland Cod and lowest in the Cod of the Irish Sea with gradations from north to south. From the Irish Sea through the Danish waters to the Baltic the number of vertebrae again increase. On the other hand the number of fin rays in the second dorsal fin decreases progressively from Greenland to the Baltic.

In the discussion the following took part:— Fishery Director ASSERSON, Dr. BOWMAN, Mr. JESPERSEN, Dr. RUSSELL and Mr. OSCAR SUND.

2) **La Norvège** continuera les investigations hydrographiques sur les principaux champs de pêche en hiver et au printemps, par l'intervention du Prof. Hjort et du Directeur des Pêcheries d'après un plan de travail semblable à celui de l'année passée, (Voir le rapport administratif p. 108).

3) **La Norvège** continuera ses investigations par l'intermédiaire du Prof. Hjort et du Directeur des Pêcheries.

4) **L'Angleterre** est disposée à donner de l'assistance en fournissant des facilités pour l'accomodation d'un observateur norvègien à bord d'un chalutier anglais travaillant dans la Mer de Barents et peut-être à entreprendre la mensuration d'une certaine quantité de poissons (Morue, Églefin, Plie) apportés de la mer de Barents dans les ports anglais.

L'Écosse est disposée à rendre service au Comité de la même manière et, en outre, peut-être à envoyer un observateur scientifique sur un chalutier commercial pour faire des mensurations et d'autres observations dans la Mer de Barents.

Le Prof. Hjort est réélu comme Président du Comité.

Comité du Secteur Nord-Ouest.

Président: Le Prof. Johs. Schmidt.
Le Comité se réunit à 3 h. p.m. le 4 Sept. 1926.

Le Président souhaite la bienvenue à Monsieur Oscar Sund qui assiste pour la première fois comme membre à la séance du Comité.

Le rapport administratif de l'année est reçu et approuvé par le Comité.

Le Président donne un court aperçu du travail accompli durant la croisière du "Dana" entre la mi-Mai et la mi-Août, en Islande et aux Faroe et du travail des autres Pays participants dans ce secteur. (Voir le rapport administratif pour 1925—1926 pp. 143—150).

Le Président ensuite décrit brièvement le progrès des investigations sur les races de la morue dans l'Atlantique Nord; il montre que le nombre de vertèbres est le plus élevé pour la morue du Groenland et le plus bas pour la morue de la Mer d'Irlande, avec une gradation du Nord au Sud. De la Mer d'Irlande jusqu'à la Baltique, à travers les eaux danoises, le nombre des vertèbres s'accroît; d'autre part le nombre des rayons de la seconde nageoire dorsale décroît, progressivement, du Groenland à la Baltique.

Les membres suivants ont pris partie à la discussion: Mr. le Directeur des Pêcheries Asserson, Dr. Bowman, Mr. Jespersen, Dr. Russell et Mr. Oscar Sund.

The following programme for the ensuing year was adopted:—

Denmark.

1) Hydrographical and pelagic work:—
   a) To be made at various fixed stations in continuation of previous work.
   b) To be made during the cruises of Research-ships.
2) Age determinations of representative samples of the five species of fish with which the Committee deals (Cod, Haddock, Plaice, Halibut, Herring) with the view of ascertaining fluctuations in the age composition of the stocks.
3) Comparison of the quantity of fish found inside and outside the territorial limit by means of:—
   a) Trawling experiments.
   b) Marking experiments.
4) Investigations of the Food of the Herring made on the north coast of Iceland by examining the stomach-contents of Herrings and the Plankton at places where Herring shoals occur.

England. Collection of measurements of Cod, Plaice, Haddock and Halibut from market material and by fish measurers on one or two voyages to Iceland during the spring months: (Cod and Plaice otoliths to be taken).

Collection of general statistics.

France. Hydrographical observations by "Ville d'Ys" and "Pourquoi Pas".

If possible hydrographical section by Dr. Charcot from Scoresby Sound to Iceland.

Norway. Will procure scales and otoliths of Cod, Haddock and Halibut from Greenland and Faroe during the line fishing season.

Stomachs of Herring from the north coast of Iceland with necessary details as to time and position of the catch by purse-seine for the study of the relation between the food of the Herring and the Plankton.

Collection of small Cod for racial investigation from the west coast of Norway.

Scotland. Hydrographic and pelagic work in Faroe-Shetland Channel and between Faroe Bank and Butt of Lewis approximate April—May.

Cod. Trawling experiments at Faroe and Faroe Bank (Measurement, Sex, Otoliths, Food Content). If possible observation on board commercial trawlers on the south coast of Iceland throughout the spawning period. Material from west coast of Scotland for racial investigations.

Haddock. Age determination of Scottish and Danish material collected at Faroe and Faroe Bank and in Aberdeen market.

Halibut. Spawning period. Monthly determination of index and condition for Iceland and Faroe. If possible collection of Halibut otoliths from market material.

Le programme suivant pour l'année prochaine est adopté:

Danemark.

1) Travail hydrographique et pélagique,
   a) à faire à diverses stations fixes et continuation des travaux précédents,
   b) à faire au cours des croisières du navire de recherche,
2) Détermination de l'âge d'échantillons représentatifs des cinq espèces de poissons dont le Comité s'occupe, (Morue, Églefin, Plie, Flétan, Hareng) pour reconnaître les fluctuations dans la composition des stocks au point de vue de l'âge.
3) Comparaison de la quantité de poisson trouvée à l'intérieur et à l'extérieur de la limite territoriale au moyen:
   a) d'expériences de chalutage,
   b) d'expériences de marquage.
4) Investigations sur la nourriture du hareng à faire sur la côte Nord de l'Islande, en examinant le contenu stomacal et le plancton aux endroits où se rencontrent les bancs de harengs.

Angleterre. Collection d'exemplaires et mensurations de Morue, Plie, Églefin et Flétan provenant des marchés, recueillis par les mesureurs de poisson pendant un ou deux voyages en Islande pendant les mois de printemps. (On prendra des otolithes de Morue et de Plie.)

Collection de statistiques générales.

France. Observations hydrographiques sur la "Ville d'Ys" et le "Pourquoi-pas".

Si possible exécution d'une section hydrographique par le Dr. Charcot, du détroit de Scoresby à l'Islande.

Norvège. On procurera des écailles et des otolithes de Morue, d'Églefin et de Flétan du Groenland et de Faroe, pendant la saison de la pêche à la ligne.

On recueillera aussi des estomacs de harengs de la côte Nord de l'Islande avec les indications nécessaires de temps et de position des captures à la seine à bourse, pour l'étude de la relation entre la nourriture du hareng et le plancton.

Collection de petites morues pour l'investigation des races de la côte Ouest de Norvège.

Écosse. Travail hydrographique et pélagique dans le canal Faroe-Shetland et entre le banc de Faroe et le Butt-of-Lewis, vers Avril—Mai.

Morue: expériences de chalutage à Faroe et au banc de Faroe (mensuration, sexe, otolithes, contenu alimentaire), si possible, observations à bord de chalutiers de commerce sur la côte Sud d'Islande pendant toute la période de frayage. Matériel de la côte Ouest d'Écosse pour l'étude des races.

Églefin: détermination de l'âge du matériel écossais et danois recueilli à Faroe et au banc de Faroe, ainsi que sur le marché d'Aberdeen.

Flétan: Période de frayage, observation mensuelle de l'index et de la condition pour l'Islande et Faroe. Si possible collection d'otolithes de flétan sur le matériel de marché.

The form for the next Administrative Report should be the same as that adopted by the other Committees.

Prof. SCHMIDT was re-elected as Chairman to the Committee.

North Sea Committees.

I. Combined Committee.

Chairman: Mr. DAVID T. Jones.
Meeting held on 3rd Sept. 1926, at 10 a. m.

The Chairman congratulated the members of the two sub-committees of the North Sea Committee on having accomplished the bulk of the work embodied in the programme adopted in 1925, and referred to the exhaustive reports which had been circulated as to the progress made.

No meetings of the Committee had been held during the course of the year owing to the fact that no urgent problems had arisen calling for discussion.

II. Southern North Sea Committee.

The Committee met Sept. 3rd.
Present: K. A. ANDERSSON, Mr. BJERKAN, Dr. BOWMAN, Dr. JOHANSEN, Dr. TESCH and Mr. BORLEY (in the chair).

The Chairman informed the Committee that Prof. GILSON could not reach Copenhagen until Monday. Regret was expressed at his absence, and it was agreed to meet on Tuesday for the purpose of hearing an account of his work on Belgian inshore fisheries. Having thanked the members for their co-operation in the production of the Administrative Report and other matters, Mr. BORLEY said that their Agenda were now increased by certain recommendations and requests of the Consultative Committee, which however could mostly be considered as the subjects with which they were concerned arose.

The Administrative Draft Report was then approved.

Dr. JOHANSEN described some marking and transplantation experiments with Plaice carried out in the North Sea in April 1925. A study of the growth of the specimens recovered from the transplantation experiment shows that these have grown much more quickly than those which had remained in the Horns Reef area. In the course of one year the specimens transplanted had increased abt. 9 cm. in length, while those resting in the Horns Reef area had increased only 4 cm.

Administrative Report. The form and preparation of the next report was then discussed. It was agreed that subject to the concurrence of the Consultative Committee, this should be arranged according to the investigations under-

La forme du prochain rapport administratif devra être la même que celle qui est adoptée par les autres Comités.

Le Prof. SCHMIDT est réélu comme Président du Comité.

Comités de la Mer du Nord.

I. Comité Combiné.

Président: Mr. DAVID T. JONES.
Séance du 3 Septembre 1926 à 10 h. a.m.

Le Président félicite les membres des deux Sous-Comités du Comité de la Mer du Nord, pour l'accomplissement de la masse de travail comprise dans le programme adopté en 1925; il mentionne les rapports approfondis concernant les progrès réalisés, qui ont été distribués.

Il n'a été tenu aucune réunion au cours de l'année parceque, en fait, il ne s'est présenté aucun problème urgent réclamant discussion.

II. Comité du Sud de la Mer du Nord.

Le Comité se réunit le 3 Septembre.
Présents: Dr. K. A. ANDERSSON, Mr. BJERKAN, Dr. BOWMAN, Dr. JOHANSEN, Dr. TESCH et Mr. BORLEY, Président.

Le Président fait connaître au Comité que le Professeur GILSON ne peut pas arriver à Copenhague avant lundi. On exprime des regrets au sujet de son absence et on décide de se réunir mardi pour entendre un compte-rendu de son travail sur la pêche littorale Belge. Après avoir remercié les membres pour leur coopération à l'élaboration du rapport administratif et à d'autres matières, Mr. BORLEY dit que les Agendas se sont accrus de certaines recommandations et demandes du Comité consultatif, qui cependant pourront être envisagées lorsque les sujets qu'elles concernent seront traités.

Le projet du rapport administratif est approuvé.

Le Dr. JOHANSEN décrit des expériences de marquage et de transplantation sur la plie, conduites dans la Mer du Nord en Avril 1925. Une étude de la croissance des spécimens récupérés de l'expérience de transplantation montre qu'ils ont grandi beaucoup plus vite que ceux qui étaient restés dans la région de Horns Riff. Au cours d'une année les spécimens transplantés avaient grandi d'environ 9 cms, en longueur, tandis que ceux qui séjournaient dans la région de Horns Riff s'étaient accrus seulement de 4 cms.

Rapport administratif. La forme et la préparation du prochain rapport sont discutés. On convient que — avec la coopération du Comité consultatif — ce rapport sera disposé suivant les investigations entreprises, qu'il établira une distinc-

taken, should distinguish between work completed, and that in progress, and should indicate suggestions for further work: it was further decided that the period reported upon should terminate three months before the date of the next Council meeting, that quarterly progress reports of an informal character should be sent to the Chairman, and that these or their substance should then be circulated.

Facilities for research. It was considered desirable to record the period during the coming year in which Research vessels would be at work in the Southern North Sea. These were as follows:— Belgium. "Oithona" and "Zinnia" occasional cruises October to June. Denmark. "Dana": Occasional cruises October to April. England. "George Bligh": Sept.—December and April onwards. France. "Quentin Roosevelt". Holland. Sea work in May.

The desirability of asking the Statistical Committee to furnish a list of fishery statistical publications bearing on the work was agreed, and the matter referred for consideration to the joint North Sea Committee.

Programmes for the investigations during the ensuing year. The Chairman read Resolutions No. 3 and 4 of the Consultative Committee. It was agreed that the programme should consist of only such items as it was intended to work upon in the period mentioned, and that the following investigations should be presented to the Consultative Committee as the programme of the Southern North Sea Committee. The countries working on each item are indicated by the first letters of their names.

Fish.

Cod.

1) Determination of the dispersal of larval and post-larval stages (Da. in April).
2) Measurements at sea of unselected catches on Commercial vessels, distinguishing retained and rejected (E).
3) Study of market statistics (E).
4) Study of food and feeding habits. Competing species. Condition of nourishment. Quantity of food available in a selected area (E).
5) Study of methods of Age determination, in conjunction if possible with tank experiments (E).
6) Study of the migrations, including marking experiments with mature Cod (E).
7) Experiments with Savings-Trawls (E).

tion entre le travail achevé et le travail en cours et qu'il formulera des suggestions pour le travail ultérieur. On décide en outre que la période sur laquelle s'étendra ce rapport se terminera trois mois avant la date de la prochaine réunion du Conseil, et que des rapports trimestriels concernant les progrès, d'un caractère officieux, devront être envoyés au Président et distribués soit en entier soit en résumé.

Moyens de recherche. On à considéré comme désirable d'être renseigné sur la période de l'an prochain pendant laquelle les navires de recherche seront en activité dans le Sud de la Mer du Nord. Les renseignements sur ce point sont les suivants: Belgique: "Oithona" et "Zinnia" croisières occasionnelles d'Octobre à Juin. Danemark: "Dana" croisières occasionnelles d'Octobre à Avril. Angleterre: "George Bligh", Septembre—Décembre, Avril et ultérieurement. France: "Quentin Roosevelt". Hollande: travail en mer, en Mai.

On convient qu'il serait désirable de demander au Comité statistique de fournir une liste des publications statistiques ayant des rapports avec le travail; la question sera soumise à l'examen du Comité combiné de la Mer du Nord.

Programme de recherches pour l'année suivante. Le Président lit les résolutions 3 et 4 du Comité consultatif. On convient que le programme devra comprendre uniquement les sujets sur lesquels il est projeté de travailler pendant la période mentionnée, et que les investigations à suivre seront présentées au Comité consultatif comme programme du Comité du Sud de la Mer du Nord. Les pays travaillant sur chacun de ces sujets sont indiqués par les premières lettres de leur nom.

Poissons.

Morue.

1) Détermination de la dispersion des stades larvaires et postlarvaires. (Da. en Avril.)
2) Mensurations, en mer, de pêches non sélectionnées, sur des navires de commerce, en distinguant ce qui est conservé et ce qui est rejeté. (A.)
3) Étude de la statistique de marché. (A.)
4) Étude de la nourriture et des habitudes alimentaires. Espèces concurrentes. Conditions de nutrition. Quantité d'aliment disponible dans un secteur choisi. (A.)
5) Étude des méthodes de détermination de l'âge, en conjonction, si possible, avec des expériences en réservoir. (A.)
6) Étude des migrations, y compris des expériences de marquage avec des morues matures (A.).
7) Expériences avec des chaluts épargneurs. (A.)

Haddock.

1) The study of good and bad survival years for Haddock over a period. (Da).
2) Measurements at sea on commercial vessels of unselected catches, distinguishing retained and rejected (E. The records are sent to Scotland).

Herring.

1) Yearly and monthly statistics of Herring landed from each fishery according to Weight, Value, methods of fishing and place of capture (E).
2) Investigation of representative unsorted samples of known place and time of capture, especially as to spawning shoals, as to Size, Weight, Sex, Maturity and Age (E, F, H).
3) Investigation of the younger stages, especially as to distribution (B, Da, H, Sc).
4) Investigation of the rate of Growth especially by the Scale method (E, F).
5) Race investigations according to a uniform method of study of morphological characters (Da, E, F, H).
6) Location of spawning places, especially by the occurence of eggs and newly hatched larvae (Da, F, E).
7) Investigation of the food of larval and post-larval Herrings (Da, H).
8) Investigation of the food and the condition of the older Herrings in different localities and in different seasons (E).

Plaice.

1) The continuation of Ichthyometrics and of detailed statistics (E).
2) The continuation of the Leman—Haaks line for the collection of Otoliths and Plaice measurements (E, H). The execution of similar work in the Eastern Grounds, probably in a line westward from Esbjerg (Da). The collection of Otoliths on occasions other than these continuous lines of trawling (Da, E).
3) The estimation of abundance of 0 and I Group Plaice along the continental coasts, and of the frequency and distribution of various year Groups on the Horn's Reef Grounds (Da).
4) Investigation of the food and feeding habits of Plaice (E).
5) Investigation of differences of growth rate and their causes (E).
6) Transplantation experiments (Da).
7) The continuance of investigations of the action of nets of various types and mesh, directed to the development of efficient Savings Gear (E).
8) Continuation of research on littoral fishing (B).

Églefin.

1) Étude pendant une période des années de bonne et de mauvaise survivance pour l'églefin. (Da.)
2) Mensurations en mer de pêches non sélectionnées, sur des navires de commerce, en distinguant ce qui est conservé et ce qui est rejeté. (A. Les données sont envoyées en Écosse.)

Hareng.

1) Statistique annuelle et mensuelle du hareng apporté de chacune des pêcheries et distinguant le poids, la valeur, le mode de pêche et le lieu de capture. (A.)
2) Investigations sur des échantillons représentatifs, non triés, d'origine connue, en temps et lieu de capture, spécialement au point de vue des bancs de frayage, de la taille, du sexe, de la maturité et de l'âge. (A. F. H.)
3) Investigations sur les stades jeunes, spécialement au point de vue de la distribution. (B. Da. H. É.)
4) Investigations sur la rapidité de la croissance, spécialement par la méthode de l'écaille. (A. F.)
5) Investigations sur les races, par une méthode uniforme d'étude des caractères morphologiques. (Da. A. F. H.)
6) Localisation des lieux de frayage, spécialement par la rencontre des oeufs et des larves récemment écloses. (Da. F. A.)
7) Investigations sur la nourriture du hareng larvaire et postlarvaire. (Da. H.)
8) Investigations sur la nourriture et sur la condition des harengs plus âgés en différentes localités et différentes saisons. (A.)

Plie.

1) Continuation de l'ichthyométrie et de la statistique détaillée. (A.)
2) Continuation de la ligne Leman—Haaks pour le prélèvement d'otolithes et les mensurations de la plie. (A. H.) Exécution d'un travail analogue dans les champs de l'Est, probablement sur une ligne courant d'Esbjerg vers l'Ouest. (Da.) Collection d'otolithes en d'autres occasions que celles de ces lignes continués de chalutage. (Da. A.)
3) Estimation de l'abondance de la plie des groupes 0 et 1, le long des côtes continentales ainsi que de la fréquence et de la distribution de divers groupes annuels sur les champs de Horns Riff. (Da.)
4) Investigations de la nourriture et des habitudes alimentaires de la plie. (A.)
5) Investigations des différences de rapidité de croissance et de leurs causes. (A.)
6) Expériences de transplantation. (Da.)
7) Continuation des investigations sur l'action de divers types de filets et de mailles, en vue de la recherche d'engins épargneurs efficaces. (A.)
8) Continuation des recherches sur la pêche littorale. (B.)

Other Fish.

The provision of Sprat material for the researches of Mr. BJERKAN (B, E, H).
Researches concerning the Hake of the North Sea (F).

Plankton.

Researches into Plankton will in the main be carried out in connection with the investigations into the food of fishes.

Food of Herring over an area E. of the northern part of the English coast will be investigated quarterly (E).

Benthos.

Benthos samples will be taken in connection with the investigations into the food of fish (Da, E).

Hydrography.

Research Vessels.

1) Observations of Salinity and Temperature will be made in the course of cruises devoted to the study of Fish and Plankton (Da, E).
2) In co-operation with British Naval Patrol vessels a survey of the central North Sea surface Salinities and Temperature will be made in June (E).
3) Further tests of a Densimeter designed for Temperature determination will be made (E).
4) Residual current observations will be made by means of the Carruthers' Current Indicator (E).
5) Observations will be made from the cruisers "Zinnia" (B) and "Quentin Roosevelt" (F).

Surface Observations from other Vessels.

1) The following routes will provide records of Temperature and material for Salinity observations, the countries indicated determining salinities.
   Shields—Oslo (E). Gothenburg—Newcastle (Sw). Gothenburg—Yorkshire (Sw). Hull—Hanstholm (E). Esbjerg—Harwich (Da). Harwich—Hook of Holland (E). Flushing—Folkestone (H). Newhaven—Dieppe (E). Southampton—Havre (E). Ostend—Tilbury (B).
2) The following Light vessels make these observations:—
   Horns Reef (Da). Terschelling (H). Haaks (H). North Hinder (H). West Hinder (B). Sandettie (F). Varne (E). Smith's Knoll (E).
3) At Varne, and occasionally at other Light vessels, Resultant Current observations are made by Carruthers' Current Indicator (E).

Autres Poissons.

Fournitures de sprats pour les recherches de Mr. Bjerkan. (B. A. H.)
Recherches concernant le merlu de la Mer du Nord. (F.)

Plancton.

Des recherches sur le plancton seront poursuivies avant tout en connexion avec l'investigation de la nourriture des poissons.

La nourriture du hareng dans un secteur s'étendant à l'Est de la partie nord de la côte Anglaise sera investiguée trimestriellement. (A.)

Benthos.

Des spécimens du Benthos seront prélevés concurremment avec les investigations sur la nourriture des poissons. (Da. A.)

Hydrographie.

Navires de recherche.

1) Des observations de salinité et de température seront faites au cours des croisières consacrées à l'étude des poissons et du plancton. (Da. A.)
2) En coopération avec les navires de la patrouille navale anglaise une exploration des salinités et températures de surface dans la partie centrale de la Mer du Nord sera faite en Juin. (A.)
3) De nouveaux essais d'un densimètre disposé pour la détermination de la température seront faits. (A.)
4) Des observations de courant résiduel seront faites à l'aide de l'indicateur de Carruthers. (A.)
5) Des observations seront faites sur les croiseurs "Zinnia" (B.) et "Quentin Roosevelt" (F.).

Observations de Surface par d'autres Navires.

1) Les lignes suivantes fourniront des observations de température et du matériel pour les observations de salinité; — les Pays indiqués déterminant les salinités.
   Shields—Oslo (A.). Gothenburg—Newcastle (S.). Gothenburg—Yorkshire (S.). Hull—Hanstholm (A.). Esbjerg—Harwich (Da.). Harwich—Hook van Holland (A.). Flessingue—Folkestone (H.). Newhaven—Dieppe (A.). Southampton—Le Havre (A.). Ostende—Tilbury (B.).
2) Les bateaux-phares suivants font les mêmes observations:
   Horns Riff (Da.); Terschelling (H.); Haaks (H.); Nord Hinder (H.); West Hinder (B.); Sandettie (F.); Varne (A.); Smiths Knoll (A.).
3) Au Varne, et occasionellement à d'autres bateaux-phares, des observations de courant résultant sont faites à l'aide de l'indicateur de courant de Carruthers (A.).

4) Scotland has agreed to endeavour to run a line of samples from Aberdeen to Hamburg, and Norway along lines to be determined.

Deposits.

These will be examined off the Danish coast (Da).

In all sections of the programme the co-operation of England and Scotland will continue.

For the information of other workers the provisional sea programme of the English Research Vessel "George Bligh" is summarised below:—

1926		
October	Plaice work on the Eastern Grounds. Mesh observations.	
December	Surface observations on salinity in central North Sea.	
1927		
April	Plaice	Plankton.
May	Plaice	Mesh.
June	Hydrographic cruise (surface salinity) in co-operation with British Naval vessels in central North Sea.	Plankton.
July	Plaice	Mesh.
August	Hydrography inclusing use of Resultant Current indicator.	Plankton.
September	Mesh.	
October	Plankton	Mesh.
November	Mesh.	
December	Hydrography	Mesh.

Savings Gear. The Consultative Committee had requested the Area Committees to consider this matter. It will be noted that investigations of savings gear are provided under the sections dealing with various fish. Wider consideration of the subject was referred, with the approval of the Chairman of the Northern North Sea Committee, to the joint North Sea Committee. In regard to the execution of any comparisons of nets of different designs however, the Southern North Sea Committee recommended that the gear should be employed alternately from the same ship at the same place and time.

Publication of Biological Statistics with a view to protection of future stock. Resolution 6 of the Consultative Committee was read, and the matter was referred in the same way to the joint North Sea Committee.

The meeting was adjourned.

4) L'Écosse a promis d'essayer d'exécuter une ligne d'échantillons d'Aberdeen à Hambourg, et la Norvège des lignes à déterminer.

Sédiments.

Ils seront examinés au large de la côte danoise (Da.).

Dans toutes les sections du programme la coopération de l'Angleterre et de l'Écosse continuera.

Comme informations pour d'autres travailleurs voici le programme de mer provisoire du navire de recherche anglais "George-Bligh":

1926.

Octobre.	Travail sur la plie sur les champs de l'Est. Observations sur les mailles.	
Décembre.	Observations de salinité de surface, dans le centre de la Mer du Nord.	
1927.		
Avril.	Plie.	Plancton.
Mai.	Plie.	Mailles.
Juin.	Croisière hydrographique (salinité de surface) en coopération avec les navires de la division navale anglaise dans le centre de la Mer du Nord.	Plancton.
Juillet.	Plie.	Mailles.
Août.	Hydrographie, y compris l'usage de l'indicateur de courant résultant. Plancton.	
Septembre.	Mailles.	
Octobre.	Plancton.	Mailles.
Novembre.	Mailles.	
Décembre.	Hydrographie.	Mailles.

Engins Épargneurs. Le Comité consultatif a demandé aux Comités des secteurs de considérer cette question. On remarquera que les investigations sur les engins épargneurs sont prévues dans les sections traitant de divers poissons. Une plus ample considération du sujet a été renvoyée, avec l'approbation du Président du Comité du Nord de la Mer du Nord, au Comité combiné de la Mer du Nord. Cependant au sujet des comparaisons à faire entre des filets de différents modèles, le Comité du Sud de la Mer du Nord recommande que les engins soient employés alternativement du même bateau dans le même temps et à la même place.

Publication d'une statistique biologique en vue de la protection des stocks futurs. La résolution 6 du Comité consultatif est lue et le sujet est renvoyé aussi au Comité combiné de la Mer du Nord.

La réunion est ajournée.

The Committee met on Sept. 7th.
Present: Dr. Andersson, Dr. Bowman, Prof. Gilson, Dr. Johansen, Dr. Tesch and Mr. Borley (in the chair).

Prof. Gilson presented a résumé of the researches on littoral fishing which he has carried on for 21 years along the Belgian coast. Entirely new methods had to be devised, in the absence of all statistical data concerning the characteristics of small fish under the smallest commercial size. He obtained the help of three fishermen fishing for him once a week and delivering their entire catch to the laboratory for analysis, measuring and tabulation. At the same time he was himself doing control work with the research ship in the same region and outside of it. The result of this extensive work will appear shortly *in extenso*. Some of the most important features shown in regard to Plaice, Dab and Sole were variation of the mean number of small fish in one haul in the successive months and also in the course of the year from 1905 to 1914 and after the war until 1924. The increase of the small fish population in the immediate vicinity of the shore as a result of the interruption of the fishing during the war is now established. The evaluation of the quantity of fish which would be protected by the size limits of 18 and 25 centimeters respectively, was given and the prohibition of fishing in territorial waters in April and May, in force in Belgium, was criticised as oppressive and useless.

In the course of the discussion which followed the paper the hope was expressed that Prof. Gilson's work would continue uninterrupted, and the following resolution was referred to the Consultative Committee:—

The Committee desires to express its appreciation of the work carried out by Professor Gilson on the littoral fisheries of Belgium and to emphasise its great economic and scientific importance, particularly in view of the increased use of motor power in the vessels engaged in these fisheries. It learns with regret that the work is likely to be interrupted, and asks the Council to consider representing to the Belgian Government the great desirability of its continuance.

III. Northern North Sea Committee.

Chairman: Dr. A. Bowman.
The Committee met at 2,30 p. m. on 3rd Sept. 1926.

The Committee received and approved the Administrative Report for the year.

Dr. Johansen drew attention to the fact that at Iceland, as in the northern North Sea, while a certain proportion of the summer brood of Herring reaches the scaled stage by the end of the year, a proportion is carried over the winter months

Le Comité se réunit le 7 Septembre.
Présents: Dr. Andersson, Dr. Bowman, Prof. Gilson, Dr. Johansen, Dr. Tesch et Mr. Borley, Président.

Le Prof. Gilson présente un résumé des recherches sur la pêche littorale, qu'il a poursuivies pendant 21 ans sur la côte Belge. Des méthodes entièrement neuves ont du être inventées, en l'absence de toute donnée statistique concernant les caractéristiques du jeune poisson d'une taille inférieure à la plus petite taille commerciale. Il a obtenu l'aide de trois pêcheurs pêchant pour lui une fois par semaine et livrant leur capture complète au laboratoire pour l'analyse, la mensuration et la tabulation. En même temps il faisait lui même du travail de contrôle avec le navire de recherche, dans la même région et en dehors d'elle. Le résultat de ce travail très étendu sera publié très prochainement *in extenso*. Quelques uns des plus importants détails établis au sujet de la plie, de la limande, et de la sole concernent la variation du nombre moyen de petits poissons fournis par un coup de filet, pendant chaque mois de l'année et aussi au cours des années de 1905 à 1914 et après la guerre jusque 1924. L'accroissement de la population de jeunes poissons au voisinage immédiat de la côte résultant de l'interruption de la pêche pendant la guerre est maintenant établi. L'évaluation de la quantité de poissons qui serait protégée par les tailles minimales de 18 et de 25 centimètres est indiquée et la prohibition de la pêche dans les eaux territoriales en Avril et Mai, en vigueur en Belgique, est critiquée comme oppressive et illusoire.

Au cours de la discussion qui suit cette communication, on exprime l'espoir que le travail du Prof. Gilson se poursuivra sans interruption et la résolution suivante est transmise au Comité consultatif:

Le Comité désire exprimer son appréciation du travail accompli par le Prof. Gilson, sur les pêcheries littorales de Belgique, et insiste sur sa grande importance économique et scientifique particulièrement en vue du développement que prend l'usage des moteurs sur les navires engagés dans ces pêcheries. Il apprend avec regret que ce travail est menacé d'interruption et prie le Conseil de remarquer qu'il y aurait lieu de faire savoir au Gouvernement Belge que sa continuation est grandement désirable.

III. Comité du Nord de la Mer du Nord.

Président: Dr. A. Bowman.
Le Comité se réunit à 2,30 h. p.m. le 3 Sept. 1926.

Le Comité reçoit et approuve le rapport administratif pour l'année.

Le Dr. Johansen attire l'attention sur le fait qu'en Islande, comme dans le Nord de la Mer du Nord, tandis qu'une partie de la génération d'été atteint le stade à écailles vers la fin de l'année, une certaine proportion traverse les mois

in the unscaled condition. This fact has an important bearing on the question of the correct age-determination of the adults.

The Committee considers it desirable that investigations should be made during the spring months to ascertain the intensity of spawning of Herring in the northern North Sea on the western side of the Norwegian Channel.

A short preliminary account was given by Dr. MOLANDER of the investigations on the distribution and spawning places of the Witch made by the Research Steamer "Skagerak" during May and June 1926.

He found it spawned on clay bottom in depths of 80 to 90 metres over a wide area. No spawning places were found either in the Norwegian Channel or in the Skagerak. The Skagerak is to be regarded mainly as a growing place for the immature individuals.

The recommendations made by the southern North Sea Committee as to the form of the next Administrative Report, the exchange of provisional reports on the progress of the work and the dates for sending in final reports and presenting the Administrative Report to the Bureau, were adopted.

The following programme was adopted for the ensuing year.

Haddock.

Holland. Scale samples to be taken together with measurements.

Norway. Provision of scale samples for comparison with material from other areas.

Scotland.

1) Age composition of the stock as ascertained from commercial statistics, ichthyometric data, market measurements with scale samples and trawling experiments by the Research Steamer.
2) Spawning areas and intensity of spawning.
3) Numerical strength and extent of distribution of the 1926 and 1927 broods.
4) The food of the Haddock and the amount available on the different grounds. Competing species.
5) Marking experiments — improvement in methods.
6) The eliminating action of different types of gear on the Haddock population.

Sweden. Collection of material for age-determination of the catches made by the Research Vessel in the North Sea during summer.

Herring.

Norway. The spawning of herring on the western side of the Norwegian Channel during the spring of 1927.

d'hiver à l'état non écaillé. Ce fait a une importance considérable pour la question de la détermination correcte de l'âge des adultes.

Le Comité considère comme désirable que les investigations soient faites pendant les mois de printemps pour déterminer l'intensité du frayage du hareng dans le Nord de la Mer du Nord, sur le côté droit du canal de Norvège.

Le Dr. Molander donne un court aperçu préliminaire des investigations faites sur le navire de recherches le "Skagerak" pendant les mois de Mai et Juin 1926, sur la distribution et les lieux de frayage de la plie cynoglosse.

Il a trouvé qu'elle fraye sur les fonds vaseux par une profondeur de 80 à 90 mètres, soit dans le canal de Norvège, soit dans le Skagerak. Le Skagerak doit être considéré surtout comme un lieu de croissance pour les individus immatures.

Les recommandations faites par le Comité du Sud de la Mer du Nord au sujet de la forme du prochain rapport administratif, sur l'échange de rapports provisoires sur les progrès du travail et sur les dates d'envoi du rapport final et de la présentation du rapport administratif au bureau, sont adoptées.

Le programme suivant est adopté pour l'année prochaine:

Églefin.

Hollande. Prise d'échantillons pour les écailles, en même temps que des mensurations.

Norvège. Provision d'échantillons d'écaille pour la comparaison avec le matériel d'autres régions.

Écosse.

1) Composition du stock au point de vue de l'âge, d'après les renseignements de la statistique commerciale, données ichthyométriques, mensuration de marché avec échantillons d'écailles, et recherches de chalutage par le navire de recherches.
2) Secteurs de frayage et intensité du frayage.
3) Importance numérique et extension de la distribution des générations de 1926 et 1927.
4) La nourriture de l'églefin et la quantité disponible sur les différents champs. Espèces concurrentes.
5) Expériences de marquage. Perfectionnement des méthodes.
6) L'action éliminatrice des différents types d'engins sur la population d'églefins.

Suède. Collection de matériel pour la détermination de l'âge des captures faites par le navire de recherche dans la Mer du Nord pendant l'été.

Hareng.

Norvège. Le frayage du hareng du côté ouest du canal de Norvège pendant le printemps de 1927.

The age and size of the winter and spring Herring on the Norwegian West Coast.

Scotland.

1) The location of the spawning places of the spring and autumn broods and their dispersal therefrom.
2) The distribution of the large unscaled and the small scaled sizes of the spring and autumn broods.
3) The discrimination of the young year-classes of the spring and autumn broods.
4) Analysis of the spawning shoals.
5) Racial investigations.

Sweden. Herring fishing experiments during the summer cruise.

Cod.

Scotland. Collection of data and marking experiments during the trawling Cruises of the Research Vessel.

Witch.

Sweden. Continuation of the investigations on the distribution and spawning places of the witch during the nummer.

Plaice.

Scotland.

1) Age-determination of the plaice caught during the trawling cruise.
2) Marking experiments.

Sprat.

Norway. Continuation of the investigations to the age and size of the sprats throughout the whole year.

Scotland. Provision of data and of representative samples (each of 150 to 200 specimens) from the Scottish Coast.

Hydrography.

Denmark. Hydrographic investigations on the passage from Denmark to Faroe probably in June and August.

Holland. Observations on the usual Herring grounds of the Dutch Herring fleet. Temperature observations on board selected Dutch fishing drifters each time when shorting their gear. The temperature will be taken by means of reversing thermometers of Bergens Nautik at different depths. Water-samples will also be collected from different depths and then will afterwards be examined for salinity by titration.

L'âge et la taille du hareng d'hiver et du printemps sur la côte ouest de la Norvège.

Écosse.

1) Localisation des lieux de frayage des générations de printemps et d'automne et leur dispersion dans ces lieux.
2) Distribution de la grande taille sans écailles et de la petite taille avec écailles, des générations de printemps et d'automne.
3) Distinction des jeunes classes annuelles des générations de printemps et d'automne.
4) Analyse des bancs de frayage.
5) Investigations sur les races.

Suède. Expériences de pêches du hareng pendant une croisière d'été.

Morue.

Écosse. Collection de données et expériences de pêche pendant la croisière d'été du navire de recherche.

Plie Cynoglosse.

Suède. Continuation des investigations sur la distribution et sur les lieux de frayage de la plie cynoglosse pendant l'été.

Plie.

Écosse.

1) Détermination de l'âge de la plie capturée pendant la croisière de chalutage.
2) Expériences de marquage.

Sprat.

Norvège. Continuation des investigations sur l'âge et la taille des sprats pendant toute l'année.

Écosse. Collection de données et d'échantillons représentatifs (de 150 à 200 spécimens chacun) de la côte d'Écosse.

Hydrographie.

Danemark. Observations hydrographiques dans la traversée du Danemark aux Faroe, probablement en Juin et Août.

Hollande. Observations sur les lieux de pêche ordinaires de la flotte hollandaise de pêche au hareng. Observations de température à bord de certains pêcheurs hollandais au filet dérivant, à chaque levée des engins. La température sera prise avec le thermomètre à renversement (Bergens Nautik) à différentes profondeurs, des échantillons d'eau seront aussi prélevés à différentes profondeurs et seront ensuite analysées par titration.

Norway.

1) Hydrographic section in the autumn from Bergen or Utsira westwards to the North Sea plateau.
2) Hydrographic observations from the Móre coast out to sea during the early months of 1927.
3) Surface observations of temperature and salinity on the line between Bergen and Tyne and/or the line Bergen—Hamburg.

Scotland.

1) Hydrographic observations made during the fishery investigations.
2) Repeated observations throughout the year at fixed stations and along fixed lines.
3) Drift bottle experiments.
4) Surface observations on the steamer route Aberdeen—Hamburg.

Sweden.

1) Hydrographical observations at the fishing station during the summer cruise.
2) Two hydrographical sections on the western part of the Norwegian Channel.

Plankton.

Denmark. Plankton collections on the passage between Denmark and Faroe probably in June and August.

Holland. Plankton samples will be gathered on the Dutch Herring fishing grounds.

Norway.

1) Plankton investigation from the Möre Coast out to sea during the early months of 1927.
2) A number of cruises will be undertaken to locate the eggs and larvae of the sprat.

Scotland.

1) Collection of Plankton on the fishing and hydrographical cruises.
2) The food of the postlarval Herrings and Haddock.
3) Intensive study of *Calanus finmarchicus*.

Sweden. Investigation of the distribution and migration of the Schizopods along the slopes of the Norwegian Channel will be continued.

Programme of Cruises of the "Explorer".

1926.

October. Frequency and distribution of the 1926 haddock brood.

October-November. Distribution of the autumn brood of larval and post-larval clupeoids.

December. Trawling Experiments.

Norvège.

1) Section hydrographique, de Bergen ou d'Utsire, dans l'ouest vers le plateau de la Mer du Nord.
2) Observations hydrographiques à partir de la côte de Möre vers la haute mer pendant les premiers mois de 1927.
3) Observations de température et de salinité de la surface de la ligne de Bergen à la Tyne et/ou la ligne Bergen—Hambourg.

Écosse.

1) Observations hydrographiques au cours des recherches de pêcherie.
2) Observations répétées pendant toute l'année à des stations fixes et sur des lignes fixées.
3) Expériences de bouteilles à dérive.
4) Observations de surface sur la ligne de steamer Aberdeen—Hambourg.

Suède.

1) Observations hydrographiques aux stations de pêche pendant la croisière d'été.
2) Deux sections hydrographiques dans la partie ouest du canal de Norvège.

Plancton.

Danemark. Prélèvements de plancton pendant les traversées entre le Danemark et les Faroe, probablement en Juin et Août.

Hollande. Des échantillons de plancton seront prélevés sur les champs de la pêche Hollandaise au hareng.

Norvège.

1) Investigations de plancton de la côte de Möre, vers le large pendant les premiers mois de 1927.
2) Quelques croisières seront faites pour localiser les oeufs et les larves du sprat.

Écosse.

1) Prises de plancton pendant les croisières de pêche et d'hydrographie.
2) La nourriture des harengs et de l'églefin post-larvaires.
3) Étude intensive du *Calanus finmarchicus.*

Suède. Les investigations sur la distribution et les migrations des Schizopodes sur les côtes du canal de Norvège seront continuées.

Programme des Croisières de l'„Explorer".

1926.

Octobre. Abondance et distribution de la génération de 1926 de l'églefin.

Octobre-Novembre. Distribution de la génération d'automne des clupéides larvaires et post-larvaires.

Décembre. Expériences de chalutage.

1927.

February. Trawling Experiments.

March-April. Survey of the Haddock Spawning areas. Distribution of the autumn and spring post-larval and larval clupeoids.

May-June. Survey of the area to the north of Scotland and the Minch.

July-August. Survey of the summer Herring fishing grounds. — Sampling of the Herring shoals.

September-October. Frequency-distribution of the 1927 Haddock brood.

November-December. Experimental trawling. The distribution of the autumn brood of post-larval Herrings.

Routine trawling, hydrographic and plankton observations will be made on all cruises and the general survey of the relation of the bottom fauna to the food of the commercial species of fishes continued.

IV. Combined Committee.

1) At the conclusion of the meetings of the two Area Committees Dr. V. I. Pettersson gave an interesting address illustrated by charts and diagrams on the relation between the hydrographic conditions and the catches of fish in the North Sea and this was followed by a discussion on the points raised. The Committees expressed their gratitude to Dr. Pettersson for his novel and interesting address.
2) The Committee passed a resolution that the North Sea Committees request the Statistical Committee to provide particulars of the publications giving fishery statistics for the various nations fishing the North Sea.
3) A discussion was initiated on the question of biological statistics as a basis of prediction of future results. Scotland agreed to consider the question with regard to the Haddock.
4) Re-election of Chairmen. On the motion of Dr. A. C. Johansen seconded by Dr. le Danois it was unanimously decided to re-elect Mr. David T. Jones as the Chairman of the Combined Committee and Messrs. Borley and Bowman as the Chairmen of the two sub-committees for the coming year.

1927.

Février. Expériences de chalutage.

Mars-Avril. Inspection des secteurs de frayage de l'églefin. Distribution des clupéides post-larvaires et larvaires d'automne et de printemps.

Mai-Juin. Inspection du secteur du Nord de l'Écosse et du Minch.

Juillet-Août. Inspection des champs de pêche du hareng d'été. Échantillonnage des bancs de harengs.

Septembre-Octobre. Abondance et distribution de la génération de 1927 de l'églefin.

Novembre-Décembre. Chalutage expérimental. Distribution de la génération d'automne du hareng post-larvaire.

On fera du chalutage courant et des observations hydrographiques et planctoniques pendant toutes les croisières et on continuera l'étude générale de la relation de la faune du fond avec la nourriture des espèces commerciales de poissons.

IV. Comité Combiné.

1) A la clôture des réunions des deux Comités des secteurs, le Dr. V. I. Pettersson donne une intéressante conférence, illustrée de cartes et de diagrammes, sur la relation existante entre les conditions hydrographiques et les captures de poissons dans la Mer du Nord, suivie d'une discussion sur les questions soulevées. Le Comité exprime sa gratitude au Dr. Pettersson pour sa conférence aussi neuve qu'intéressante.

2) Le Comité vote une résolution déclarant que les Comités de la Mer du Nord demandent que le Comité statistique fournisse le détail des publications donnant des statistiques de pêcherie pour les diverses nations pêchant dans la Mer du Nord.

3) On commence une discussion sur la question des statistiques biologiques prises comme base d'une prédiction de résultats futurs. L'Écosse accepte de considérer la question au sujet de l'églefin.

4) Réélection des Présidents: Sur la proposition du Dr. A. C. Johansen, appuyée par le Dr. le Danois, on décide à l'unanimité de réélire Mr. David T. Jones comme président du Comité combiné et MM. Borley et Bowman comme présidents des deux Sous-Comités, pour l'an prochain.

Transition Area Committee.

Meeting on the 4th of September 1926.
All members of the Committee present.
Dr. JOHANSEN in the chair.

The following communications were made to the committee:—

1) Dr. NYBELIN: On the distribution of *Nyctiphanes norvegica* in the Skagerak and its relation to Herring.
2) Dr. BLEGVAD: The sources of the stock of Plaice in the Baltic.
3) Dr. A. C. JOHANSEN: On the causes of good and bad survival years for the Plaice in the southern Kattegat and Belt Sea.
4) Dr. A. C. JOHANSEN: The predictions as to the yield of the Eel-fisheries.
5) Dr. A. C. JOHANSEN: Experiments with seines of different mesh.

The following programme for the coming year was adopted:

Herring.

Denmark. Investigations will be continued on the following lines:—

1) Location of spawning places.
2) Investigation as to distribution and frequency of larvae and young Herring.
3) Investigation on the rate of growth of the Herring.
4) Frequency of the different year-classes.
5) Racial investigations to be continued.
6) Food-investigations to be continued.

Norway. Collection of samples for age, size and maturity investigations.

Sweden.

1) Collection of samples for age determinations.
2) The distribution of various races of Herring in the Skagerak.
3) Investigations as to the frequency of the larvae off the south coast of Sweden.

Sprat.

Denmark. Collection of samples to be sent to Mr. BJERKAN.

Norway. Investigations on the age and growth, through collection of amples.

Sweden. Collection of samples to be sent to Mr. BJERKAN.

Cod.

Denmark.

1) Distribution and frequency of larvae.
2) Frequency of different year-classes.

Comité du Secteur de Transition.

Réunion du 4 Septembre 1926.
Tous les membres du Comité sont présents.
Président: Le Dr. JOHANSEN.

Les communications suivantes sont faites au Comité:

1) Dr. NYBELIN: Sur la distribution du *Nyctiphanes norvegica* dans le Skagerak et sa relation avec le hareng.
2) Dr. BLEGVAD: Les sources du stock de plie dans la Baltique.
3) Dr. A. C. JOHANSEN: Sur les causes de bonnes et de mauvaises années de survivance pour la plie dans le Sud du Cattegat et dans les Belts.
4) Dr. A. C. JOHANSEN: Les prédictions au sujet du produit de la pêcherie de l'anguille.
5) Dr. A. C. JOHANSEN: Expériences avec des seines à mailles de grandeurs diverses.

Le programme suivant pour l'année prochaine est adopté:

Hareng.

Danemark. Les investigations continueront dans les directions suivantes:

1) Localisation des bancs de frayage.
2) Investigations sur la distribution et la fréquence des larves et des jeunes harengs.
3) Investigations sur la rapidité de croissance du hareng.
4) Abondance dans les diverses classes annuelles.
5) Continuation des investigations sur les races.
6) Continuation des recherches sur l'alimentation.

Norvège. Collection d'échantillons pour l'étude de l'âge, de la taille et de la maturité.

Suède.

1) Collection d'échantillons pour déterminer l'âge.
2) Distribution des diverses races de harengs dans le Skagerak.
3) Investigations sur l'abondance des larves au large de la côte Sud de Suède.

Sprat.

Danemark. Collection d'échantillons à envoyer au Mr. BJERKAN.

Norvège. Investigations sur l'âge et la croissance à l'aide de la collection d'échantillons.

Suède. Collection d'échantillons à envoyer au Mr. BJERKAN.

Morue.

Danemark.

1) Distribution et abondance des larves.
2) Abondance des diverses classes annuelles.

Norway.

1) Investigations in connection with rearing experiments in the fiords and the coastal regions, especially as to the fry and young fish.
2) Age determinations of older stages.

Sweden.

1) Continued investigations in the Fiords of Bohuslän.
2) Investigations of the stock of Cod in the Kattegat.

Haddock.

Denmark. Investigations of the stock in the Kattegat and Belt Sea.

Sweden.

1) Collection of statistics regarding the quantities of different size-categories of Haddock landed in Göteborg.
2) Measurements once a month of representative samples of the various size-categories.
3) Investigations upon the stock in Skagerak and Kattegat.

Plaice.

Denmark.

1) Investigations regarding the distribution and frequency of the 0-Gr. and the older year-classes.
2) Age and size of fish landed by commercial vessels.
3) Marking and transplantation experiments.

Sweden. Investigations as to the stock in the Fjords of Bohuslän and off the south coast of Sweden.

Witch.

Norway. Investigation of fish landed as to length and maturity.

Sweden.

1) Continued studies on the stock in the Skagerak.
2) Marking experiments.

Plankton.

Programme for preceding year adopted for all countries.

Hydrography.

Programme for preceding year adopted for all countries.

The following General Recommandations were agreed upon:—

1) Concerning a scientific report for the Transition Area it was agreed that — at convenient time — the Chairman should take the initiative in this matter and ask the members of the Committee to contribute to such a report.

Norvège.

1) Investigations en rapport avec les expériences d'élevage dans les fjords et dans les régions côtières, en particulier sur le fretin et les jeunes poissons.
2) Détermination de l'âge des stades plus avancés.

Suède.

1) Continuation des investigations dans les fjords du Bohuslän.
2) Investigations sur le stock des morues du Cattegat.

Églefin.

Danemark. Investigations sur le stock du Cattegat et des Belts.

Suède.

1) Collection de statistiques concernant les quantités de différentes catégories de tailles de l'églefin débarqué à Göteborg.
2) Mensurations une fois par mois d'échantillons représentatifs de diverses catégories de tailles.
3) Investigations sur le stock du Skagerak et du Cattegat.

Plie.

Danemark.

1) Investigations concernant la distribution et l'abondance du groupe 0 et des classes annuelles plus anciennes.
2) Age et taille du poisson débarqué par les navires de commerce.
3) Expériences de marquage et de transplantation.

Suède. Investigations sur le stock des Fjords du Bohuslän et du large de la côte Sud de Suède.

Plie Cynoglosse.

Norvège. Investigations sur la longueur et la maturité du poisson débarqué.

Suède.

1) Continuation des études sur le stock du Skagerak.
2) Expériences de marquage.

Plancton.

Le programme de l'année passée est adopté pour tous les pays.

Hydrographie.

Le programme de l'année précédente est adopté pour tous les pays.

On est d'accord pour les recommandations générales suivantes:

1) Au sujet d'un rapport scientifique pour le Secteur de Transition on convient que le Président — en temps opportun — prendra l'initiative en cette matière et demandera aux membres du Comité d'apporter leur contribution au rapport.

2) The Committee considers it very important that further experiments should be made with saving gears of different models in order to find means of protecting the young of certain food-fishes, and recommends that comparative experiments with different models should be made at the same time, on the same spot and from the same ship.

The committee reelected Dr. A. C. JOHANSEN as a chairman for the ensuing year.

Baltic Area Committee.

Meeting of the 4th of Sept. 1926.
All Members of the Committee present.
Chairman: Dr. K. A. ANDERSSON.

Prof. WITTING gave a short communication of work carried out in Finland and especially dealt with the plan of hydrographical investigations in Finland.

Dr. JOHANSEN reported on the Danish marking experiments of the Plaice.

Prof. SIEDLECKI demonstrated by means of diagrams a supposed connection between the quantity of water running out from Vistula and the catches of Sprat off the Polish coast.

The Chairman gave a short report on the works accomplished on the cruises in the Baltic with the researchship "Skagerak" and the researchmotorboat "Eystrasalt" during last spring and summer.

Dr. ANDERSSON dealt with the influence of the fisheries on the stock of Plaice and described the diurnal vertical migration of the animal Plankton in the middle Baltic and demonstrated by means of Plankton samples that the animal Plankton increases in quantity, passing northward from the middle part of the Baltic through Åland Sea to the Gulf of Bothnia.

The following programme for the coming year was adopted:—

Baltic Herring.

Denmark. To study the racial characters in the Bornholm Deep and also to make investigations as to the distribution and frequency of the larval stages.

Finland. Analysis of year-classes at some stations on the coast of Finland.

Latvia. Observations on the different year-classes on the coast of Latvia.

2) Le Comité considère comme très important que de nouvelles expériences soient faites avec des engins épargneurs de différents modèles en vue d'arriver à pouvoir protéger les jeunes de certains poissons alimentaires, et recommande que des expériences comparatives avec ces différents modèles soient faites au même moment, au même endroit, et par le même navire.

Le Comité réélit le Dr. A. C. JOHANSEN comme Président pour l'an prochain.

Comité du Secteur Baltique.

Réunion le 4 Septembre 1926.
Tous les membres du Comité sont presents.
Président: le Dr. K. A. ANDERSSON.

Le Prof. WITTING présente une courte communication au sujet du travail accompli en Finlande, et traite particulièrement du plan des investigations hydrographiques en ce pays.

Le Dr. JOHANSEN fait rapport sur les expériences danoises, de marquage de la plie.

Le Prof. M. SIEDLECKI démontre à l'aide de diagrammes une connexion probable entre la quantité d'eau déversée par la Vistule et les captures de sprat au large de la côte de Pologne.

Le Président présente un court rapport sur le travail exécuté au cours des croisières dans la Baltique par le navire de recherche le "Skagerak" et le bateau à moteur "Eystrasalt" pendant le printemps et l'été passés.

Le Dr. ANDERSSON traite de l'influence des pêcheries sur le stock de la plie; il décrit la migration verticale diurne du plancton animal dans la Baltique moyenne et démontre à l'aide d'échantillons de plancton que le plancton animal gagne en quantité quand on passe de la partie moyenne de la Baltique en marchant vers le Nord par la Mer d'Åland jusqu'au Golfe de Bothnie.

Le programme suivant est adopté pour l'an prochain:

Hareng Baltique.

Danemark. Étude des caractères de race dans la profondeur de Bornholm, et aussi des investigations concernant la distribution et l'abondance des stades larvaires.

Finlande. Analyse des classes annuelles à quelques stations sur la côte de Finlande.

Lettonie. Observations sur les diverses classes annuelles sur la côte de Lettonie.

Sweden. To continue the study of the horizontal and vertical migration of the Herring, especially in the first year, and to make observations on the food of the Herrings and fluctuation of the different year-classes.

Sprat.

Poland. Investigations on distribution, growth and age.

Sweden. To study the growth, age and life history during the first year of the fish.

Cod.

Denmark. To attempt to do marking experiments.

Finland. To do marking experiments in the Finland Bight and also to study the age of Cod.

Sweden. To do marking experiments and study the distribution of eggs and larvæ, the food of the early stages and the fluctuations of the year-classes.

Plaice.

Denmark. Investigations on the frequency of different year-classes in Bornholm Deep.

Sweden. The study of the rate of growth and changes in the stock.

Flounder.

Finland. Marking experiments are to be carried out in Finland Bight.

Sweden. To study the distribution of eggs and larvæ, the food of early stages and to do marking experiments.

Turbot.

Sweden. Investigations on the Turbot of the South coast.

Salmon.

Denmark. To continue investigation into age and growth of sea Trout.

Finland. To continue the present work.

Latvia. To continue the experiments already begun.

Poland. To investigate the age and growth of Salmon in the Baltic and Vistula.

Sweden. To collect scales of Salmon for the study of growth and migration.

Suède. Continuation de l'étude de l'émigration horizontale et verticale du hareng, particulièrement pendant la première année, et observations sur la nourriture des harengs et sur la fluctuation des différentes classes annuelles.

Sprat.

Pologne. Investigations sur la distribution, la croissance et l'âge.

Suède. Étude de la croissance, de l'âge et des conditions de vie pendant la première année du poisson.

Morue.

Danemark. Essais d'expériences de marquage.

Finlande. Expériences de marquage dans le Golfe de Finlande et aussi étude de l'âge de la morue.

Suède. Expériences de marquage et étude de la distribution des oeufs et des larves, de la nourriture des stades jeunes et des fluctuations des classes annuelles.

Plie.

Danemark. Investigations sur l'abondance des différentes classes annuelles dans la profondeur de Bornholm.

Suède. Étude de la rapidité de croissance et changement dans les stocks.

Flet.

Finlande. Expériences de marquage à faire dans le Golfe de Finlande.

Suède. Étude de la distribution des oeufs et des larves et de la nourriture des stades jeunes. Expériences de marquage.

Turbot.

Suède. Investigations sur le turbot de la côte Sud.

Saumon.

Danemark. Continuation des investigations sur l'âge et la croissance de la truite de mer.

Finlande. Continuation du travail.

Lettonie. Continuation des expériences commencées.

Pologne. Investigations de l'âge et de la croissance du saumon dans la Baltique et dans la Vistule.

Suède. Collection d'écailles de saumon pour l'étude de la croissance et de la migration.

Plankton.

Poland. To make a preparatory study of the fluctuations in the Plankton.

Sweden. Investigations on the fluctuation and to make a survey of the distribution in the Gulf of Bothnia.

Statistics.

All countries to endeavour to obtain statistics for the whole coast.

Seals.

All countries to gather statistics of Seals killed during the year.

Hydrography.

Denmark. To carry out combined Fishery and Hydrographical experiments.

Finland. To carry out the general programme [1]) with the exception of para. 5.

Latvia. Observations are to be made from passenger ships.

Sweden. To carry out the general programme [1]) with the exception of para. 6.

The following recommendation was agreed upon:—

Concerning a scientific report for the Baltic Area it was agreed that at convenient time the Chairman should take the initiative in this matter and ask the members of the Committee to contribute to such a report.

The Committee reelected Dr. K. A. Andersson as the Chairman for the next year.

Atlantic Slope Committee.

Chairman: Dr. Ed. le Danois.

1) With a view to continuing the study of hydrographical and biological conditions in the Bay of Biscay, periodical cruises will be made, every three months if possible, by the Governments of France, Spain and the Irish Free State, the conditions being as follows:

Spain: 8° W from the coast to 47° N.
47° N between 8° W and 9° W.
9° W from 47° N to the coast of Spain.

France: From Ushant to 49° N—8° W.
8° W from 49° N to 47° N.
From 47° N, 8° W, to Ushant.

[1]) see Rapp. et Proc. Verb. XXXIV p. 31.

Plancton.

Pologne. Études préparatoires des fluctuations du plancton.

Suède. Investigations sur la fluctuation et inspection de la distribution dans le Golfe de Bothnie.

Statistique.

Tous les pays s'efforceront d'obtenir des statistiques pour toute la côte.

Phoques.

Tous les pays recueilleront la statistique des phoques tués pendant l'année.

Hydrographie.

Danemark. Exécution d'expériences combinées de pêcherie et d'hydrographie.

Finlande. Exécution du programme général[1]) à l'exception du Par. 5.

Lettonie. Observations à bord de navires à passagers.

Suède. Exécution du programme général[1]) à l'exception du par. 6.

La recommandation suivante est agréée:

Au sujet d'un rapport scientifique pour le Secteur Baltique, il est convenu que le Président prendra, en temps opportun, une initiative en la matière et demandera aux membres du Comité d'apporter leur contribution à ce rapport.

Le Comité réélit le Dr. K. A. Andersson comme Président pour l'année prochaine.

Comité du Plateau Continental Atlantique.

Président: Dr. Ed. le Danois.

1) En vue de continuer l'étude des conditions hydrographiques et biologiques dans le Golfe de Gascogne, des croisières périodiques, trimestrielles si possible, seront effectuées par les Gouvernements de la France, de l'Espagne et de l'État libre d'Irlande dans les conditions suivantes:

Espagne: 8° W. G. de la côte jusqu'au 47° N.
47° N. entre 8° W. G. et 9° W. G.
9° W. G. du 47° N à la côte d'Espagne.

France: d'Ouessant à 49° N—8° W.G.
8° W.G. de 49° N à 47° N.
de 47° N—8° W.G. à Ouessant.

[1]) Voir Rapp. et Proc. Verb. XXXIV p. 31.

Ireland: 8° W from the coast to 49° N.
49° N between 8° and 9° W.
9° W from 49° N to the coast of Ireland.

These cruises will be made as far as possible during the months of February, May, August and November.

2) The study of the western Channel will be undertaken by the British Government, in the form of periodical cruises by the vessel of the M.B.A., in accordance with the plan submitted by Dr. Allen.
3) The Irish Free State will undertake cruises to the south-west of Ireland, according to programme, with a view to determining the position of the 35.5 $^{0}/_{00}$ isohaline.
4) The studies of this Committee will be extended southward to the regions of Madeira, the Azores, the Cape Verde Islands and the Canaries.
5) Portugal and Spain will arrange for combined study in the Bay of Spain.
6) Investigations in the neighbourhood of Gibraltar will be made so as to accord with those of the Mediterranean Commission.
7) Investigations on hake, common tunny, long finned tunny and sardine will be continued in their present form.
8) Investigation of the races of herring will be combined and developed in the western Channel and in the waters to the S.W. of the British Isles.
9) Investigations according to biological statistics.

The Committee re-elected Dr. Ed. le Danois as the Chairman for the next year.

Irlande: 8° W.G. de la côte jusqu'au 49° N.
49° N entre 8° W.G. et 9° W.G.
9° W.G. du 49° N à la côte d'Irlande.

Ces croisières auront lieu autant que possible aux mois de Février, Mai, Août et Novembre.

2) L'étude de la Manche Occidentale sera faite par les soins du Gouvernement de Grande Bretagne sous forme de croisières périodiques exécutées par le navire de la M.B.A. conformément au plan présenté par M. le Dr. Allen.
3) L'État libre d'Irlande exécutera des croisières au S.W. de cette île selon le programme actuel afin de préciser la position de la ligne isohaline 35,5 ‰.
4) Les études du Comité seront étendues vers le sud dans les régions de Madère, des Açores, des Iles de Cap Verd et des Iles Canaries.
5) Le Portugal et l'Espagne feront un accord pour une étude combinée dans la baie d'Espagne.
6) Les recherches avoisinant Gibraltar seront faites en accord avec celles de la Commission de la Méditerranée.
7) Les études sur le merlu, le thon rouge, le germon, la sardine seront continuées sous la forme actuelle.
8) L'étude des races de hareng sera combinée et développée dans la Manche Occidentale et dans la region S.W. des îles Britanniques.
9) Investigations conformément aux statistiques biologiques.

Le Comité réélit le Dr. Ed. le Danois comme Président pour l'année prochaine.

Programmes and Reports of other Committees.

Hydrographical Committee.

Meeting Monday the 6th at 2 p.m.
Chairman: Prof. Martin Knudsen.

1) The list of members was revised to the effect that Finland: Prof. Witting, and Holland: Director van Everdingen, France: Dr. le Danois, Poland: Prof. Siedlecki should be added.
2) Dr. V. I. Pettersson reported on preparatory work on material contained in the old Bulletins hydrographiques. The Committee expressed the wish, that this work should be continued.
3) In answer to the resolution passed by the Bureau on the 4th September regarding economies in hydrographical publications the Committee appointed a Sub-committee consisting of Mr. Borley, Dr. Bowman and Dr. Pettersson, and proposed that the question should be laid before the Editorial Committee.
4) Prof. Magrini, Secretary of the Oceanographical Section of the International Union for Geodesy and Geophysics laid before the Committee an invitation addressed to the President of the Council concerning participation in the work of standardising of methods and instruments by nominating technical experts to attend a meeting in Prague next year. The Committee recommends that the Council accept the invitation.
5) The recommendation of the Consultative Committee regarding the quarterly Bulletin was read. For the consideration of technical details a Sub-committee consisting of Mr. Borley, Dr. Bowman and Dr. Pettersson was appointed.
6) The proposals of the Chairmen of the Area Committees as to hydrographic programmes were agreed to.
7) The Committee proposes that Prof. Knudsen should continue as Chairman of the Committee.

Hydrographical Sub-Committee.

a) Some small economy could be affected by abstaining from printing in tabular form in the quarterly Bulletin the results of the surface observations in areas

Programmes et Rapports des autres Comités.

Comité Hydrographique.

Réunion le lundi 6 Septembre 1926 à 2 h. p.m.
Président: le Prof. Martin Knudsen.

1) La révision de la liste des membres a pour résultat l'adjonction de la Finlande: le Prof. Witting, de la Hollande: le Prof. van Everdingen, de la France: le Dr. le Danois, et de la Pologne: le Prof. Siedlecki.
2) Le Dr. V. I. Pettersson fait rapport sur le travail préparatoire sur le matériel contenu dans les anciens bulletins hydrographiques. Le Comité exprime le voeux que ce travail soit continué.
3) En réponse à la résolution formulée par le Bureau, le 4 Septembre, au sujet des économies, à réaliser dans les publications hydrographiques, le Comité nomme un Sous-Comité comprenant Mr. Borley, le Dr. Bowman, et le Dr. Pettersson, et propose de soumettre la question au Comité éditorial.
4) Le Prof. Magrini, Secrétaire de la Section océanographique de l'Union géodésique et géophysique, soumet au Comité une invitation adressée au Président du Conseil, à participer au travail de standardisation des méthodes et des instruments, en nommant des experts techniques qui assisteront à la réunion de Prague l'année prochaine. Le Comité recommande que le Conseil accepte cette invitation.
5) Il est donné lecture de la recommandation du Comité consultatif au sujet du Bulletin Trimestriel; pour l'examen des détails techniques un Sous-Comité composé de Mr. Borley, du Dr. Bowman et du Dr. Pettersson est nommé.
6) Les propositions des Présidents des Comités des Aires, au sujet des programmes hydrographiques sont acceptées.
7) Le Comité propose que le Prof. Knudsen continue à exercer la présidence.

Sous-Comité Hydrographique.

a) Une petite économie pourrait être réalisée si on s'abstenait d'imprimer dans le Bulletin Trimestriel, sous la forme tabulaire, les résultats des observations

the whole of which appear on charts. The Editoral Committee is invited to consider the matter, but it would appear that there are cases in which the reproduction of the data in tabular form is necessary.

Subsurface observations should be presented in the trimestrial Bulletin in tabular form unless completely contributed in graphic form.

b) In accordance with the recommendation of the Consultative Committee it is agreed that actual values for surface salinities and temperatures in the North Sea shall be entered on charts. Attention is drawn to the advantages of entry on larger charts than those circulated, reduction to a suitable size being effected photographically: isohalines and isotherms (together) should appear on separate charts.

In areas, if any, in which observations are too closely set for individual entry it is suggested that either

1) the numbers be printed as a table on the chart or
2) the square containing the numbers put on the chart at the side in an enlarged form. The latter method is preferred.

Plankton Committee.

Tuesday, Sept. 7th at 11½ a.m.
Chairman: (in the absence of Prof. Ostenfeld) Mr. G. P. Farran.

After hearing a statement by Prof. Hjort on behalf of the General Secretary the consideration of Prof. Ostenfeld's proposal with reference to a Plankton Assistant was postponed to next year's meeting.

The technical details of various patterns of Plankton nets were discussed and the need for comparative hauls with older and newer types, in order to establish a relation between their catching powers, was emphasised.

The Committee again draws attention to the lack of adequate descriptions of the developmental stages of many Plankton organisms of economic importance and recommends that the participating countries should consider the matter and put forward practical proposals for making available the existing information and for obtaining the further data required.

de surface dans les secteurs dont les cartes donnent ces résultats au complet. Le Comité éditorial est invité à examiner la question, mais il semble qu'il y a des cas dans lesquels la répétition des données sous la forme tabulaire est nécessaire.

Les observations de sous-surface devraient être présentées dans le Bulletin Trimestriel, sous la forme tabulaire à moins qu'elles ne soient complètement exposées sous la forme graphique.

b) En conformité avec la recommandation du Comité consultatif, on convient que les valeurs réelles des salinités et températures de surface dans la Mer du Nord seront portées sur les cartes. On attire l'attention sur l'avantage qu'il y aurait à porter les données sur des cartes plus grandes que celles qui sont en circulation, — des réductions à une grandeur convenable pourront être obtenues par la photographie; les isohalines et les isothermes (ensemble) devraient être portées sur des cartes séparées.

Dans les secteurs, s'il y en a, dans lesquelles les observations sont trop serrées pour pouvoir être toutes pointées, on propose:

1) soit que les nombres soient imprimés sous forme de table sur la carte même,
2) soit que les carrés contenant les nombres soient reproduits en agrandissement sur les côtés de la carte. La dernière méthode semble préférable.

Comité du Plancton.

Mardi 7 Septembre à 11,30 h. a.m.
Président (en l'absence du Prof. Ostenfeld) M. G. P. Farran.

Après avoir entendu une communication faite par M. le Prof. Hjort, au nom du Secrétaire Général, on remet à la réunion de l'an prochain la prise en considération de la proposition du Prof. Ostenfeld au sujet d'un adjoint planctoniste.

Les détails techniques de différentes formes de filets à plancton sont discutés et on insiste sur la nécessité de faire des prises comparatives avec les anciens et les nouveaux engins afin d'établir la relation existante entre leurs pouvoirs de capture.

Le Comité attire encore une fois l'attention sur le manque de description précise des stades du développement de beaucoup d'organismes planctoniques d'une certaine importance économique et recommande que les Pays participants prennent la question en considération et fassent des propositions pratiques en vue de rendre possible l'obtention de l'information déjà existante et d'obtenir de nouvelles données nécessaires.

Statistical Committee.

The Committee met on Monday, 6th September.
Professor D'Arcy W. Thompson in the chair.
Present: MM. Andersson, Asserson, Edser, Gilson, Jones, Russell, Siedlecki, Strubberg and Captain Schøning.

A letter was read from the Bureau directing that all possible economy should be practised in the cost of publication of the Statistical Bulletin. A resolution passed by the Consultative Committee was also read, requesting consideration by the Statistical Committee of all available means of ensuring speedy publication of statistical data. These two communications were carefully considered by the Committee.

The Committee then proceeded to consider certain suggestions presented by Mr. T. Edser. It was agreed to abbreviate Tables A, B and C, reducing the number of years exhibited therein, and confining the Tables to the period from 1919 onwards, with 1913 also included for the sake of comparison. It was agreed further to omit those Tables (A II, B II, C II) in which the value of the catch is shewn in the currency of the various countries.

It being obvious that other improvements might now be made in the Bulletin, for the discussion of which time was not available, it was resolved to ask the Bureau's leave to hold a special meeting of the Statistical Committee at some convenient place and time, before the next Meeting of the Council; that the whole form of the Bulletin and its various Tables should then be discussed and revised, in the light of the communications received from the Bureau and the Consultative Committee, following the precedent of the Special Committee which met for a like purpose in Copenhagen in the year 1914.

Limnological Committee.

Meeting on the 7th of September 1926.
Temporary Chairman: Dr. K. A. Andersson.

The chairman opened the proceedings and regretted the absence of Dr. Redeke, a regret which was shared by all members of the Committee.

1) A preliminary Report on Pollution as affecting Inland Fisheries, received from Dr. Redeke, was laid before the Committee and was discussed.
2) The members of the Committee reported as follows on the work done during the past year in their respective countries:—

Denmark.

a) Investigations as to the rate of growth of the Sea-trout have been continued.

Comité Statistique.

Le Comité se réunit le lundi 6 Septembre 1926.
Président: Mr. le Prof. D'Arcy W. Thompson.
Présents: MM. Andersson, Asserson, Edser, Gilson, Jones, Russell, Siedlecki, Strubberg, et le capitaine Schøning.

Il est donné lecture d'une lettre du Bureau recommandant que toute l'économie possible soit apportée à la publication du Bulletin Statistique. On lit également une résolution adoptée par le Comité consultatif, requérant le Comité statistique de prendre en considération tous les moyens possibles d'assurer la publication rapide des données statistiques. Ces deux communications sont prises en sérieuse considération par le Comité.

Le Comité procède ensuite à l'examen de certaines suggestions présentées par M. T. Edser. Il est décidé d'abréger les tables A, B et C, en réduisant le nombre des années qui y figurent et en restreignant les tables à la période débutant en 1919, tout en y maintenant incluse l'année 1913 en vue de la comparaison. On décide en outre d'omettre les tables A. II, B. II et C. II, dans lesquelles la valeur du butin est indiquée en monnaie courante des divers pays.

Comme il est évident qu'il peut être apporté à présent au bulletin d'autres améliorations, pour la discussion desquelles le temps fait défaut, on décide de demander au Bureau la permission de tenir, en un endroit et à une époque appropriés, avant la prochaine réunion du Conseil, une réunion spéciale du Comité statistique dans laquelle toute la forme du Bulletin et de ses diverses tables serait discutée et révisée à la lumière des communications reçues du Bureau et du Comité consultatif, suivant en cela le précédent établi par le Comité spécial qui s'est réuni dans un but analogue à Copenhague en l'année 1914.

Comité Limnologique.

Réunion le 7 Septembre 1926.
Président temporaire: le Dr. K. A. Andersson.

Le Président ouvre la série des travaux et exprime au sujet de l'absence du Dr. Redeke des regrets qui sont partagés par tous les membres du Comité.

1) Un rapport préliminaire sur la pollution en tant qu'elle affecte les pêcheries intérieures, envoyé par Mr. le Dr. Redeke, est présenté au Comité et discuté.
2) Les membres du Comité font les rapports suivants sur le travail exécuté dans leurs Pays respectifs pendant l'année précédente:

Danemark.

a) Continuation des investigations sur la rapidité de croissance de la truite de mer.

b) Investigations regarding the H-ion concentrations and the amount of CaO in Sea-trout waters have been continued.

England. Under the auspices of the standing Committee on River Pollution appointed by the Ministry of Agriculture and Fisheries in 1921, many chemical surveys have been carried out on the English rivers with a view to determining the sources of pollution and their effects. Biological investigations have also been commenced on the influence of specific pollutions upon the fauna and flora of small streams.

Finland. During the past year, investigations of the composition of the year classes of *Coregonus albula* in lakes Keitele and Pyhäjärvi have been continued. Investigations on the systematic relationships of some species of Coregonus have been made. For investigations on the Salmon, see the report of the Baltic Committee.

Germany. Collections of material dealing with Salmon from the Baltic are being examined.

Ireland. Investigations were carried out on the growth and life-history of the Salmon, more especially by the study of Scales.

Investigations were made of the growth of Trout in relation to environment.

A report was published on "The Seasonal Distribution of the Crustacea of the Plankton in Lough Derg and the River Shannon", by R. Southern and A. C. Gardiner.

Latvia. Investigations on the Salmon and Coregonus.

Poland. The effects of pollution were investigated, and a short account of the work done has been published.

Experiments were made on the spawning and acclimatisation of Coregonus.

Investigations were made on the age, growth and biology of Salmon in the Vistula and adjacent rivers.

Sweden. The age, growth and migrations of Salmon were investigated, chiefly by scale examination.

Holland. By correspondence Dr. Redeke has reported as follows on the work done during the past year in his country:

Investigations on the age and growth of Salmon were continued. The food of salmon fry has been examined. Investigations have been made on the correlation of head-form and food in eels.

3) The following communications were made to the Committee:—

Dr. A. C. Johansen:— "On the Extinction of the old stock of salmon in the river Gudenaa".

C. V. Otterstrøm:— "*Coregonus lavaretus* in Danish waters".

b) Continuation des recherches sur la concentration en ion H et sur la quantité de CaO dans les eaux à truites de mer.

Angleterre. Sous les auspices du Comité permanent de la Pollution des rivières, nommé par le Ministère de l'Agriculture et des Pêcheries en 1921, un grand nombre d'inspections chimiques ont été faites dans les rivières anglaises, en vue de déterminer les sources de la pollution et leurs effects. On a aussi commencé des recherches biologiques sur l'influence de la pollution spécifique sur la faune et la flore des petits cours d'eau.

Finlande. Pendant l'année passée les investigations sur les classes nouvelles du *Coregonus albula*, dans les lacs Keitele et Pyhäjärvi ont été continuées. Des recherches sur les relations systématiques de diverses espèces de coregonus ont été faites. Pour les investigations sur le saumon de la Baltique voir le rapport du Comité Baltique.

Allemagne. Des collections de matériel en rapport avec le saumon de la Baltique sont en voie d'examen.

Irlande. Des recherches ont été poursuivies sur la croissance et la biologie du saumon et en particulier par l'étude des écailles.

Des recherches ont été faites sur la croissance de la truite dans ses rapports avec le milieu ambiant.

Un rapport a été publié sur "la distribution saisonnière des crustacés du plancton dans le 'Lough Derg' et dans le 'Shannon'" par R. Southern et A. C. Gardiner.

Lettonie. Investigations sur le saumon et le coregonus.

Pologne. Les effects de la pollution ont été étudiés et un court rapport sur le travail a été publié.

Des expériences ont été faites sur le frayage et l'acclimatation du Coregonus.

Des investigations ont été faites sur l'âge, la croissance et la biologie du saumon, dans la Vistule et les rivières voisines.

Suède. L'âge, la croissance et les migrations du saumon ont été étudiées surtout par l'examen des écailles.

Hollande. Par correspondance, le Dr. Redeke a rapporté du travail accompli pendant l'année passée dans son pays, comme suit:

Des investigations sur l'âge et la croissance du saumon ont été continuées. La nourriture du frayage du saumon a été examinée. Des investigations ont été faites sur la corrélation de la forme de tête et de la nourriture des anguilles.

3) Les communications suivantes ont été faites au Comité:

Dr. A. C. Johansen, "Sur l'extinction de l'ancien stock de saumon dans la rivière Gudenaa".

C. V. Otterström, "*Le Coregonus lavaretus* dans les eaux danoises".

4) In accordance with the ideas suggested by Prof. Roule, the Spanish delegation proposed:

a) That a Sub-Committee be nominated for the study of salmon in the area between Great Britain, Ireland, France and Spain.

b) That this Sub-Committee hold a meeting this summer at Santander to sum up the knowledge obtained up to the present on the migrations and biology of salmon in the rivers of Great Britain, Ireland, France, and Spain, and to set up a plan of combined work to be carried on by the different countries.

c) That the Spanish Delegation be asked to prepare the meeting at Santander.

After discussion of this proposal, the Committee agreed to ask Professor Roule to act as a Reporter, for communicating with the countries interested as to the feasibility of the proposal.

5) The following programme for the coming year was adopted:—

Denmark.

a) The investigations concerning the rate of growth of the sea-trout will be continued.

b) The investigations on the Coregonus will be continued.

England. Work will be continued along the same lines as in 1925—26.

Finland. The researches on Salmon and Coregonus in the Baltic and in fresh-water will be continued.

Germany. The work on Salmon will be continued.

Ireland. Investigations on the growth and life-history of the Salmon and Sea-trout.

Investigations on the growth of trout in relation to the environment.

Latvia. The work of Salmon and Coregonus will be continued.

Poland. Continuation of the studies on Salmon in Vistula and adjacent rivers concerning the age, growth and biology of this species. Continuation of experiments concerning the artificial spawning and acclimatisation of Coregonids. Continuation of the work concerning the study of water pollution.

Spain. Investigations concerning the occurrence and migrations of the Salmon in the rivers and the sea will be undertaken.

Sweden. The studies on the rate of growth and migration of Salmon will be continued by scale examination and marking experiments.

As Dr. Redeke has not had the time necessary to complete his final report on water pollution and was not present at the meeting, the committee recom-

4) D'accord avec les idées suggerées par le Prof. ROULE la Délégation espagnole a proposé:

a) Que l'on désigne une Sous-Commission pour l'étude du Saumon dans la Zone comprise entre la Grande Bretagne, l'Irlande, la France et l'Espagne.

b) Que cette Sous-Commission tienne une réunion cet hiver à Santander pour résumer les connaissances acquises jusqu'à maintenant sur les migrations et la biologie du Saumon dans les fleuves de la Grande Bretagne, Irlande, France et Espagne et pour dresser un plan de travaux commun à exécuter entre les Pays indiqués.

c) Que l'on charge la Délégation espagnole de préparer la réunion de Santander.

Après discussion de cette proposition, le Comité décide de demander au Prof. ROULE d'accepter la fonction de rapporteur en vue de prendre communication avec les Pays intéressés au sujet de la possibilité de sa réalisation.

5) Le programme suivant pour l'année prochaine est adopté:

Danemark.

a) Les investigations concernant la rapidité de la croissance de la truite de mer seront continuées.

b) Les investigations concernant le coregonus seront continuées.

Angleterre. Le travail sera continué suivant les mêmes lignes qu'en 1925—1926.

Finlande. Les recherches sur le saumon et le coregonus dans la Baltique et en eau douce seront continuées.

Allemagne. Le travail sur le saumon sera continué.

Irlande. Investigations sur la croissance et la biologie du saumon et de la truite de mer.

Recherches sur la croissance de la truite dans ses rapports avec le milieu ambiant.

Lettonie. Le travail sur le saumon et le coregonus sera continué.

Pologne. Continuation des études sur le saumon dans la Vistule et les rivières voisines au sujet de l'âge, de la croissance et de la biologie de cette espèce; continuation des expériences concernant la fécondation artificielle et l'acclimatation des coregonides. Continuation du travail concernant l'étude de la pollution des eaux.

Espagne. Des investigations concernant l'occurrence et les migrations du saumon dans les rivières et en mer seront entreprises.

Suède. Les études sur la rapidité de la croissance et les migrations du saumon seront continuées par l'examen des écailles et par les expériences de marquage.

Comme le Dr. REDEKE n'a pas disposé du temps nécessaire pour terminer son rapport final sur la pollution des eaux, et comme il n'a pas été présent à la

mends that the election of the chairman should be deferred to next Council Meeting. Dr. ANDERSSON was asked to act as temporary chairman until next Council Meeting.

Editorial Committee.

Chairman: Professor O. PETTERSSON.
Meetings on the 3rd & 8th Sept.

1) Bulletin Trimestriel and Bulletin Hydrographique.

On the form in which the Bulletin Hydrographique and the Bulletin Trimestriel ought to appear so diverging opinions had been expressed by the different Committees that the Editorial Committee resolved to recommend to the Council to postpone the final decision to a following meeting. Meanwhile, the Hydrographical Department of the Bureau should be authorized to try, by way of experiment and guided by the opinions expressed in the meetings, to find a suitable arrangement of charts, tables and text which could be discussed at the next meeting in Stockholm. If this should involve the necessity of publishing the 2 or 3 next numbers of the Bulletin Trimestriel with double North Sea charts, according to the recommendation of the Sub-Committee, the costs ought not to exceed the double of the costs of the present Bulletin Trimestriel, viz: 2.800 Kr. a year.

2) The Editorial Committee recommends that the extra costs resulting from the translation of reports and papers published by the Bureau should be borne by the Bureau.

3) The Editorial Committee resolved that the proposals of the Sub-committee appointed by the Hydrographical Committee should be put into effect in Nos. 3 and 4 of 1926 and No. 1 of 1927 of the Bulletin Trimestriel; that a circular should be sent out asking for opinions on the form of the Bulletin, and that the question should be definitely decided at the meeting of the Council in May 1927.

4) The Editorial Committee recommends to modify Pt. "Language" of the revised scheme for the Council's Journal as follows:—

"Authors of papers are free to write in their own language, but are earnestly requested to write them, if possible, in one of the four languages which are more or less universally known, namely: English, French, German and Spanish. If the author of a paper finds it necessary to write in some other language, he will be expected to consent to the translation of his paper, before printing, into one of the four languages mentioned above.

In all cases, papers should be accompanied by a summary."

réunion, le Comité recommande que l'élection du président soit remise à la prochaine séance du Conseil. On demande au Dr. ANDERSSON de faire fonction de Président temporaire jusqu'à cette prochaine réunion du Conseil.

Comité Éditorial.

Président: le Prof. O. PETTERSSON.
Réunion du 3 et du 8 Septembre 1926.

1) Bulletin Trimestriel et Bulletin Hydrographique.

Des opinions si divergentes ont été exprimées par les divers Comités au sujet de la forme sous laquelle devraient paraître le Bulletin Hydrographique et le Bulletin Trimestriel, que le Comité éditorial se décide à recommander au Conseil de différer la décision finale jusqu'à la prochaine réunion. Entretemps, le Département Hydrographique du Bureau devrait être autorisé à essayer à titre d'expérience et en se guidant par les opinions émises au cours des réunions, de trouver un arrangement convenable des cartes, des tables et du texte, qui puisse être discuté à la réunion prochaine à Stockholm. Si cet essai comportait la nécessité de publier les 2 ou 3 numéros prochains du Bulletin Trimestriel sous deux formes, la dépense ne devrait pas dépasser le double du présent Bulletin Trimestriel, soit 2800 Couronnes par an.

2) Le Comité éditorial recommande que les dépenses extraordinaires résultant de la traduction des rapports et travaux publiés par le Bureau soient supportées par le Bureau.

3) Le Comité éditorial décide que les propositions du Sous-Comité nommé par le Comité hydrographique devront être appliquées aux Nos 3 et 4 de 1926, et au No. 1 de 1927 du Bulletin Trimestriel, qu'une circulaire devra être envoyée pour recueillir les opinions au sujet de la forme du Bulletin et que la question devra être définitivement résolue à la réunion du Conseil en Mai 1927.

4) Le Comité éditorial recommande de modifier le Par. "Langue" de l'exposé revisé du Journal du Conseil, comme suit:

"Les auteurs sont libres de rédiger leurs articles en leur propre langue, mais ils sont instamment priés de les écrire, si possible, dans une des quatre langues plus ou moins universellement connues, à savoir: l'anglais, le français, l'allemand et l'espagnol. Si l'auteur d'un travail trouve nécessaire d'écrire dans une autre langue, il est présumé qu'il consente, avant l'impression, à la traduction de son travail dans une des quatre langues précitées.

En tout cas les travaux doivent être accompagnés d'un sommaire."

5) Further, under the point of "Times of issue", the Editorial Committee recommends that in view of the amount of work thrown upon the administrative staff the Journal should be published three times a year instead of quarterly.
6) With a view to decreasing the cost of proof correction, authors are earnestly requested to send in their papers in a fully corrected state, ready to sent to press, and to prepare their diagrams in such a way that they do not require to be redrawn.

Revised Scheme for the Council's Journal, as approved at Council Meeting September 1926.

Title. "Journal du Conseil international pour l'Exploration de la Mer".

Publisher. The same arrangements as for the other publications of the Council.

Times of issue. Three times a year.

Format. Same as the Publications de Circonstance, which have been discontinued.

Editorial office. 43, Parliament Street, London, S.W.1.

Contents. Normally each number will contain (1) a general article on some topic of interest to the Council as a whole, (2) one (or, if short, two) scientific papers of the kind hitherto issued as Pub. de Circ., (3) reviews of important papers relating to fishery research, (4) a bibliography of current publications, (5) notes and correspondence.

The general articles will be written it is hoped in such a way as to be readily understood by all interested in the Council's work.

Bibliography. This will deal mainly with the area covered by the Council's activities, but will not exclude reference to important work in other areas in the North Temperate and Arctic regions. A working arrangement is being sought with the Section of Oceanography of the International Geodesic and Geophysical Union. Limnological papers will not be included nor papers of a purely faunistic or zoological nature, unless of interest in connection with fishery research. Papers relating to brackish waters and to salmon and other freshwater fish studied by the Council will however be included.

Hydrography will be dealt with as fully as possible, excluding however publications which are primarily of cartographical interest.

A short indication of contents may accompany the bibliographical entries.

5) En outre sous le titre "nombre d'éditions", le Comité éditorial recommande qu'en considération de la quantité de travail imposée au personnel administratif, le Journal ne soit publié que trois fois par an, au lieu de quatre.
6) En vue de réduire la dépense de la correction des épreuves, les auteurs sont instamment priés d'envoyer leurs manuscrits sous une forme tout à fait correcte, prête pour l'impression et de préparer leurs diagrammes de façon à ce qu'ils ne doivent pas être redessinés.

Exposé revisé, concernant le Journal du Conseil, approuvé à la Réunion tenue par le Conseil au mois de septembre 1926.

Titre: "Journal du Conseil international pour l'Exploration de la Mer".
Éditeur: Même arrangement que pour les autres publications du Conseil.

Nombre d'éditions: 3 fois par an.
Format: Même que pour les "Publications de Circonstance", qui ont cessé de paraître.
Siège du rédacteur: 43, Parliament Street, London S.W.1.
Contenu: Chaque numéro contiendra normalement: 1) un article traitant dans l'ensemble un sujet présentant un intérêt général pour le Conseil, 2) un article scientifique (ou deux, s'ils sont courts) du caractère de ceux qui ont paru jusqu'ici comme Publications de Circonstance, 3) des analyses de publications importantes concernant des recherches sur la pêche, 4) une bibliographie des publications courantes et 5) des notes et une rubrique de correspondance.

Les articles généraux seront rédigés, il faut l'espérer, de manière qu'ils seront à la portée de tous ceux qui s'intéressent au travail du Conseil.

Bibliographie: Celle-ci comprendra essentiellement le secteur faisant l'objet de l'activité du Conseil sans exclure, pourtant, ce qui peut avoir trait au travail important effectué sur d'autres secteurs dans les régions tempérées et arctiques. On cherchera d'établir une collaboration avec la Section d'Océanographie de l'Union Internationale de Géodésie et Géophysique. Des traités concernant les poissons d'eau douce ne seront pas insérés, ni des études d'une nature particulièrement faunitique ou zoologique, à moins que ces études ne présentent un intérêt pour les recherches de la pêche. Cependant, des articles concernant des eaux saumâtres, le saumon et d'autres poissons d'eau douce, faisant l'objet des études du Conseil, seront insérés dans le Journal.

L'hydrographie sera traité d'une manière aussi complète que possible, avec l'exclusion néanmoins d'informations présentant un intérêt essentiellement cartographique.

Les insertions bibliographiques peuvent être accompagnées d'un exposé sommaire de leur contenu.

The bibliography will be printed in the ordinary way on both sides of the page, but arrangements will be made to supply to those who wish it a set printed on one side only.

Language. Authors of papers are free to write in their own language, but are earnestly requested to write them, if possible, in one of the four languages which are more or less universally known, namely: English, French, German and Spanish. If the author of a paper finds it necessary to write in some other language, he will be expected to consent to the translation of his paper, before printing, into one of the four languages mentioned above.

In all cases papers should be accompanied by a summary.

Payments to contributors. General articles and reviews will be paid for at the rate of 10 kroners a page.

Price. The annual subscription price is fixed at 12 Kr., single numbers 4,50 Kr.

Extracts. Authors of general articles and scientific papers will be entitled to 50 free copies of their paper.

Free List. The existing free list for the Council's publications has been revised for the Journal and cut down where possible. Due regard has however been had to the need for securing a wide distribution and adequate notice of the Journal.

Exchange. A general system of exchange with other scientific journals is not proposed, but a measure of discretion should be allowed to the Editor to exchange with journals which might otherwise be difficult to obtain, — for bibliographical purposes.

Les bibliographies seront imprimées comme d'ordinaire sur les deux côtés de la page mais il sera pris des dispositions permettant de livrer à ceux qui le désireraient, des éditions imprimées sur un seul côté de la page.

Langue: Les auteurs sont libres de rédiger leurs articles en leur propre langue mais ils sont instamment priés de les écrire, si possible, dans une des quatre langues plus ou moins universellement connues, à savoir: l'anglais, le français, l'allemand et l'espagnol. Si l'auteur d'un travail trouve nécessaire d'écrire dans une autre langue, il est présumé qu'il consente avant l'impression, à la traduction de son travail dans une des quatre langues précitées.

En tout cas les travaux doivent être accompagnés d'un sommaire.

Honoraires des auteurs: Les articles généraux et analyses sont payés à raison de 10 couronnes la page.

Abonnement: Le prix d'abonnement est fixé à 12 cour. par an; un numéro isolé coûtera cour. 4.50.

Extrait de publications: Les auteurs d'articles généraux et de traités scientifiques ont droit à 50 reproductions gratuites de leur travail.

Service gratuit du Journal: La liste d'inscription des services gratuits du Journal a été revue et réduite dans la mesure du possible. On s'est appliqué cependant à assurer au Journal la plus grande diffusion possible et l'on a pris soin également d'une publicité suffisante.

Échange: Il n'a pas été proposé de système spécial au sujet d'un échange avec d'autres publications scientifiques mais il a été laissé au rédacteur une certaine liberté d'action par rapport aux échanges avec des journaux et revues qui seraient autrement difficile de se procurer — et ce dans un intérêt bibliographique.

REPORT
of
ADMINISTRATION 1925—1926.

I. General.

Composition of the International Council for the Exploration of the Sea.

The same countries as for 1924—25 have adhered to the Council in 1925—26. During this year, Mr. Léon Verbrugghe and Mr. H. Baels have acted as Delegates for Belgium. For Great-Britain Mr. David T. Jones has replaced Professor d'Arcy Thompson as Delegate.

The Council has suffered the deplorable loss of two Delegates for Portugal: M. l'Amiral A. E. Neuparth and Colonel F. A. Chaves.

Composition of the Bureau.

The members of the Bureau were the same as the preceding year: Mr. H. G. Maurice, President, Professor Johan Hjort, Professor Otto Pettersson, M. Théodore Tissier and Captain C. F. Drechsel.

Committees.

At the meeting of the Council in Copenhagen September 1925 a new organization of work was adopted. The following Committees were established: Atlantic Slope Committee, North Western Area Committee, North Eastern Area Committee, Combined North Sea Committee, Northern North Sea Committee, Southern North Sea Committee, Baltic Area Committee, Transition Area Committee, Statistical Committee, Hydrographical Committee, Plankton Committee, Limnological Committee, Consultative Committee and Special Committee for the Closure of Moray Firth to Trawling.

These Committees have worked during the year, and their reports of the observations made form part of this Administrative Report, replacing "Work of the Participating Countries" in previous Reports of Administration.

Audit of Accounts.

The Accounts of the Council for 1924—25 as well as cash and Treasury Bills deposited have been controlled and audited by a qualified accountant and

Statement of Accounts for the financial year 1925—26.

Receipts:

			Estimates	Real Receipts
I.	1.	Balance brought forward from 1924/25	169 000.00	171 402.77
II.	2—9, 11—14.	Annual contributions of the Governments for 1925/26	145 000.00	141 334.00[1])
III.	16.	Interest of Danish Treasury Bills	2 580.00	2 580.00
	17.	„ from the Bank	4 500.00	4 069.33
IV.	18.	Sales of publications	200.00	400.80
		Total Kr.	321 280.00	319 786.90[2])

Expenditures:

			Estimates	Real Expenditures
I.	1—6.	Incidental expenses	31 000.00	31 000.00
II.	7—11.	Assistance etc.	32 750.00	30 946.15
III.	12.	Expenses of the office in Copenhagen	14 800.00	14 800.00
IV.	13.	Travelling expenses	13 000.00	6 379.23
V.	14.	Chairmen of Committees	21 000.00	21 000.00
VI.	15.	Special Resolutions of the Council	14 500.00	1 000.00
VII.	16.	Printing and distribution	35 000.00	34 334.63
VIII.	17.	Special reserve for pensions	0.00	2 639.72
		Total Kr.	162 050.00	142 099.73

Receipts for the financial year 1925—26 ..... Kr. 319 786.90[2])
Expenditures — — — — ..... - 142 099.73
Cash balance to carry forward to 1926—27 ..... **Kr. 177 687.17**

Of this Balance were deposited in Kjøbenhavns Handelsbank, Hellerup Afd. and cash ..... Kr. 128 618.15
Danish Treasury Bills, nominel Kr. 51.600,00, deposited in a box in the bank. (Market value on July 21st Kr. 51 342.00)
Purchase value ..... » 49 069.02
Kr. 177 687.17

Special reserve for pensions, deposited on a special account in the bank: Kr. 2 639.72.

[1] Portugal's contribution not yet received.
[2]) + Russia's contribution for 1914/15, **Rbl. 14 430.54,** deposited in a Leningrad bank.

revised and found correct by the Finance Committee. They are to be submitted to the Council for its approval at its meeting in 1926.

A Statement is given on page 103 of the Accounts for 1925/26 which shall be revised by the Finance Committee.

Meetings.

Meetings of the Bureau have been held in Copenhagen during the Council Meeting in September 1925 and in London in May 1926. Present were: Mr. MAURICE, President, Président TISSIER (at the meeting in Copenhagen replaced by Professor JOUBIN), Professor PETTERSSON, Professor HJORT and Captain DRECHSEL.

Five-yearly periods of adhesion to the Council.

With exceptance of Finland all Governments now represented on the Council have announced their continued adhesion to the Council after the 21st July 1926 either indefinitely or for a further period of 5 years at the present rate of contribution and subject to the existing statutes governing the constitution and proceedings of the Council. Finland has through the Finnish and Danish Foreign Offices informed the Bureau that the Finnish Institute for the Study of the Sea intends to propose to the Finnish Government to renew the adhesion to the Council, but that a definite answer cannot be given earlier than December this year.

II. Work of the Bureau at Copenhagen.

Besides administrative work, correspondance, etc. the following work has ben carried out:—

A. Publications.

Report regarding the publications issued and cost of same during the financial year 1925—26.

VII. — 16. Printing.

Rapp. & Procès-Verbaux Vol. XXXVII (additional payment)....			Kr.	564.88
— — — XXXVIII	—	800 copies.....	-	2 261.10
— — — XXXIX	—	800 copies.....	-	3 417.40
— — — XXXX	—	800 copies.....	-	1 394.50
Hydrographical Bulletin, Appendice 1 & 2	—	800 copies.....	-	1 096 80
— — — supplementaire d'observations de Surface Anglaises	—	800 copies.....	-	3 036.05
Hydrographical Bulletin, for 1925	—	800 copies.....	-	2 394.88
Statistical Bulletin, Vol. XIII	—	800 copies.....	-	3 695.86
Journal du Conseil, Vol. I No. 1 (Including honoraries to authors translations clichées etc.)	—	1200 copies.....	-	2 563.74
— - — — I - 2 (Including honoraries to authors translations clichées etc.)	—	750 copies.....	-	2 244.96
— - — — I - 3 (Including honoraries to authors translations clichées etc.)	—	750 copies.....	-	2 270.60
— - — — I Nos 1&2 Extrait	—	500 copies.....	-	321.05
carried forward....			Kr.	25 261.82

Occasional Papers: Brought forward....	Kr.	25 261.82
Publ. de Circonstance No. 89, by Chr. Hessle, 800 cop.....	-	1 188.20
— - — — 90, by J. Giral, 800 cop.....	-	383.45
— - — — 91, by Dr. V. W. Ekman, 900 cop.	-	476.15
3 monthly Bulletin, May.....	-	300.00
- — — " August.....	-	302.03
Resolutions etc.....	-	158.50
List of Publications.....	-	171.35
Distribution of Publications.....	-	2 342.48
Unforeseen expenses: Proof-readings, drawings, translations &&..	-	3 750.65
	Kr.	34 334.63
Balance..	-	665.37
	Kr.	35 000.00

B. Other Work of the Bureau.

Report of work carried out by the Departments of the Bureau during 1925—26.

a. Hydrographical Department.

A) The printing of an Appendix to the Bulletin Hydrographique for 1923 & 1924, "Bulletin Hydrographique, Appendice I et II pour les années 1923 et 1924", including only Norwegian observations has been completed in the course of April although the emission — according to the resolution of the Editorial Committee — is to be postponed until the appearing of the present years bulletin.

B) Material for the ordinary Bulletin Hydrographique received from Belgium, Denmark, Great Britain, Holland, Norway and Sweden has successively been dealt with. The bulletin is expected to appear in the course of August.

C) According to the resolution of the Editorial Committee, England has delivered a number of wartime and after-wartime observations (1915—1923) which have been worked out and printed in a separate bulletin: Appendice supplémentaire des observations de surface anglaises pour la période 1915—1923 which also will be distributed together with the ordinary bulletin.

D) Preparations for the publishing of a three-monthly bulletin as recommended by the Hydrographical Committee, Copenhagen (Sept. 1925) have resulted in the appearance on the 2nd of May of the number one, the number two has been distributed on the 2nd of August this year.

In connection with the trimestrial Nr. I, a circular from the Hydrographical Department was distributed among the members of the International Council, giving an exposure of the plan devised and the material most desirable for this bulletin.

When dealing with the material delivered for publishing in this bulletin, the Hydrographical Department has taken care that all positions are localized on monthly drafts together with the hydrographical dates of surface $t°$ and $S\,{}^{0}/_{00}$ belonging to them, so as to be immediately at hand in case of future requests.

E) Part of the material of the old Bulletins Hydrographiques from before the war has been gone through, and — on the advice of Professor KNUDSEN — the quarterly and yearly means of salinity and temperature have been calculated.

For this purpose, a table of all numbered Sc-stations was made, including all dates of observations taken on terminal cruises, all in all about 2000.

Until now, the Sc-section North Sea XIII has been gone through, some 1200 observations in 45 m. depths having been calculated as to their quarterly and yearly means of $S\,{}^0/_{00}$ and $t°$ and drawn in diagrams. By permission of Mr. EDSER of the Ministry of Agriculture and Fisheries, London, — having put the original drafts of the monthly catches of trawlers at disposal — and in accordance with Dr. A. C. JOHANSEN of the Danish Commission and Chairman of the Transition Area Committee, a hydrographical-biological study of the distribution of fish in the North Sea has been started, some 160 drafts having been copied by hand for this purpose.

F) Work of daily routine has been made, such as the receiving and arranging of books and other printed material as well as the opening and answering of letters and other correspondance.

G) Frequent Conferences have taken place with the General Secretary, Professor KNUDSEN as Hydrographical Consultant, Doctor JOHANSEN as Chairman of the Transition Area Committee etc.

H) The library, as far as hydrographic literature is concerned, has been revised. All literature stored in the upper floor has been sorted, the supernumerous Bulletins, Procès-Verbaux and Publications de Circonstance being sent to the store of the Bureau at Bianco Luno's.

I) The printing of the Publications de Circonstance Nr. 91: Prof. W. EKMAN, "On a new repeating Current Meter" and also of the Rapport Atlantique 1925. M. le Dir. E. LE DANOIS, Dr. ès sciences, have been supervised.

b. Statistical Department.

The Bulletin Statistique for the years 1921—1922 was finished in the beginning of September 1925 and distributed to the different countries. The work with the statistics for the year 1923 has been continued and the manuscript was delivered to the printer in the beginning of June this year and the second proof-print of the General Tables was forwarded during the last week of June to the different countries for perusal and remarks. The Bulletin Statistique was distributed in the beginning of August.

The work with our next edition for the year 1924, is well advanced, but the necessary material has not yet been forwarded to the Bureau from all of the participating countries.

The library of the Bureau is kept up to date.

Reports of the Area Committees.

NORTH EASTERN AREA

1925—1926.

By

JOHAN HJORT.

The material at our disposal from investigations carried out in the current financial year is of course far from being ready for publication. The following report may serve as a preliminary review of the problems and the standing of the work.

The plan of the investigations.

The previous Norwegian fishery and marine investigations have mostly had for their object the solving of special biological problems connected with the great seasonal fisheries, above all the spring fisheries for herring and cod. A study of the changes taking place in the sea during the different seasons of the year has only occasionally been taken up systematically.

The interesting results of the study of the fluctuations in the year classes within the stock of herring and cod have for some time raised the problems, whether it may be possible to find a practical way of describing the changes which take place in the layers of water as well as in the stock of those important planktonic organisms, on which depends the life of food fishes and whales, with the object in view of comparing the production of one year with that of another.

A scheme for such a work meets with the difficulty that our knowledge at present is but very imperfect, especially with regard to the frequency of the changes taking place within the layers of water. It is therefore necessary for such a study to select a somewhat small area and make frequent investigations according to a definite plan, in order to gain the preliminary knowledge necessary for the planning of the work in future.

The planktonic organisms have never been investigated along the same lines as those followed in the study of the biology of fish. A combined study of the development of the important species and of their distribution at different stages of development within the area during the different seasons of the year, must precede a more definite qualitative and quantitative study in future.

At a meeting on the 12th of December 1925, in which Messrs. H. H. Gran, Johan Hjort and Oscar Sund took part, it was decided to adopt the following plan for such preliminary work during the year 1926.

The work at sea to be confined to two areas:—

1) The coastal waters off Möre. 2) The Lofoten district. In both areas a cruise to be undertaken every second week along one and the same line, perpendicular to the coast over the Continental Shelf to the slope. Observations in each case to be made at fixed stations, where temperature readings, samples for the determination of salt, oxygen, compounds of nitrogen, samples for the study of plants according to the method of Gran, and vertical hauls with a 70 cms. closing net to be taken at certain specified depths.

The investigations in the Möre district to be carried out by Hjort and J. T. Ruud, in the Lofoten district by Oscar Sund, H. H. Gran undertaking to study the material of plants and the determination of compounds of nitrogen in the sea water to be arranged for by Professor Martin Knudsen, who has kindly offered his assistance in the matter.

Besides these investigations it was decided in cooperation with Mr. Einar Lea to make arrangements for a review of the composition of the stock of spring herring and cod in the catches of spring fisheries 1926 to be prepared for this report.

The Cruises.

Figure 1 gives the position of the stations along the section selected for the Möre district. The section starts from a deep fjord outside the town of Molde (Station A), from which point the line takes a north-westerly direction. Station B is situated in a deep channel (190 m. in depth) 5 miles off the coast, Station C on the "cod-bank" 17 miles off 90 m. deep, Station D further out (32 miles off the coast) at a depth of 140 m. on the Shelf, Station E on the 200 fathom line and Station F outside the slope some 50 miles from the coast.

The investigations along this section started in the middle of March and since then (till the end of July) 8 cruises have been made, the three first by Hjort and Ruud, those following by Ruud alone. The material was in all cruises according to the plan and has now passed through the first detailed examination by Mr. Ruud. The work will be continued till about the middle of August.

In the Lofoten district a section was planned from the town of Bodö across the Vestfjord to the islands of Röst, and thence in a straight continuation

of the line over the slope of the Continental Shelf. On account of a series of misfortunes Mr. Sund was only able to carry out three cruises, on the 26th March, the 14th of April and on the 9th of May, but these cruises will, I hope, give an idea of the situation during the spring season. The material, however, has not yet been worked up, and I must therefore confine myself to the observations from

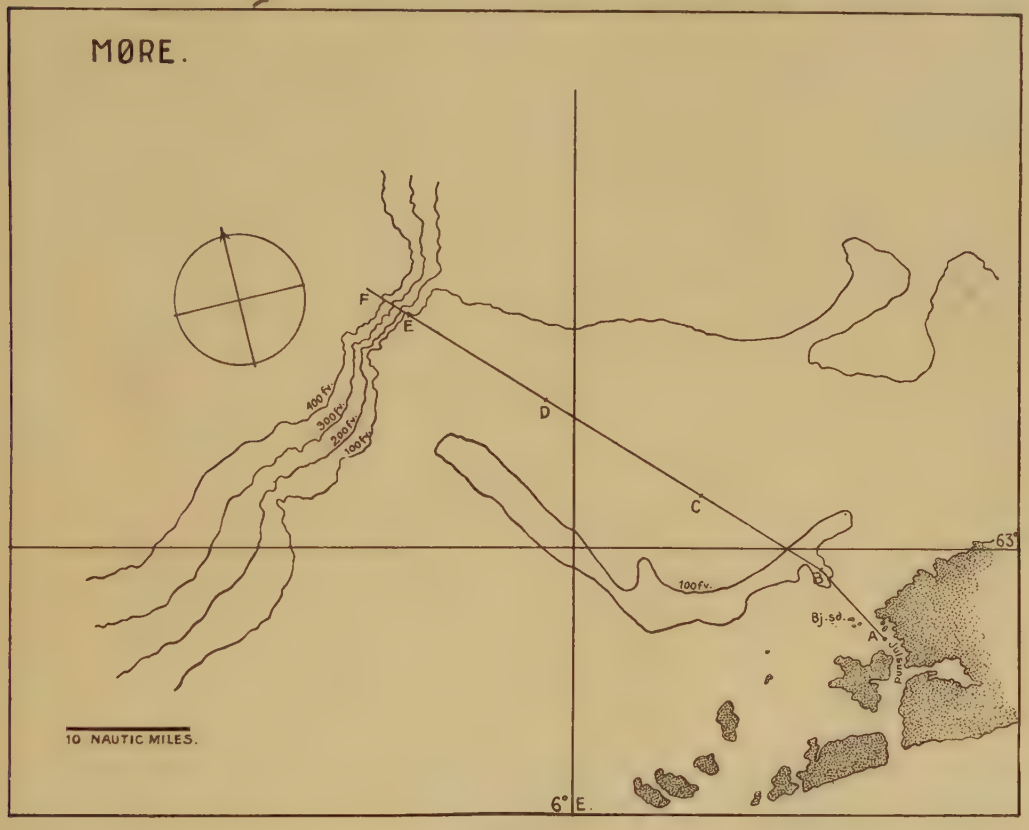


Figure 1.

the Möre area, mainly from the point of view of the general interest in the planning of such work in future.

Hydrographical observations in the Möre district.

The sections from the first three cruises (on the 16th and 26th of March and the 9th of April) all have a typically developed layer of coastal water. The curves for the salinities of 33.5, 34, 34.5 and 35‰ all run parallel and are sloped rather steeply towards the coast and it is only in the fjord that there is a thin layer

of water of a salinity less than 33 ‰. The section from the 26th of March (Figure 2) may be considered as representative of the period (which is also the spawning period of the herring and cod). There are, however, some changes even within this short period. The layer of water of a salinity less than 34 ‰ had a marked increase in magnitude during the days from the 16th to the 26th of March, and during this time it expanded out at sea away from land. On the 9th of April this layer was

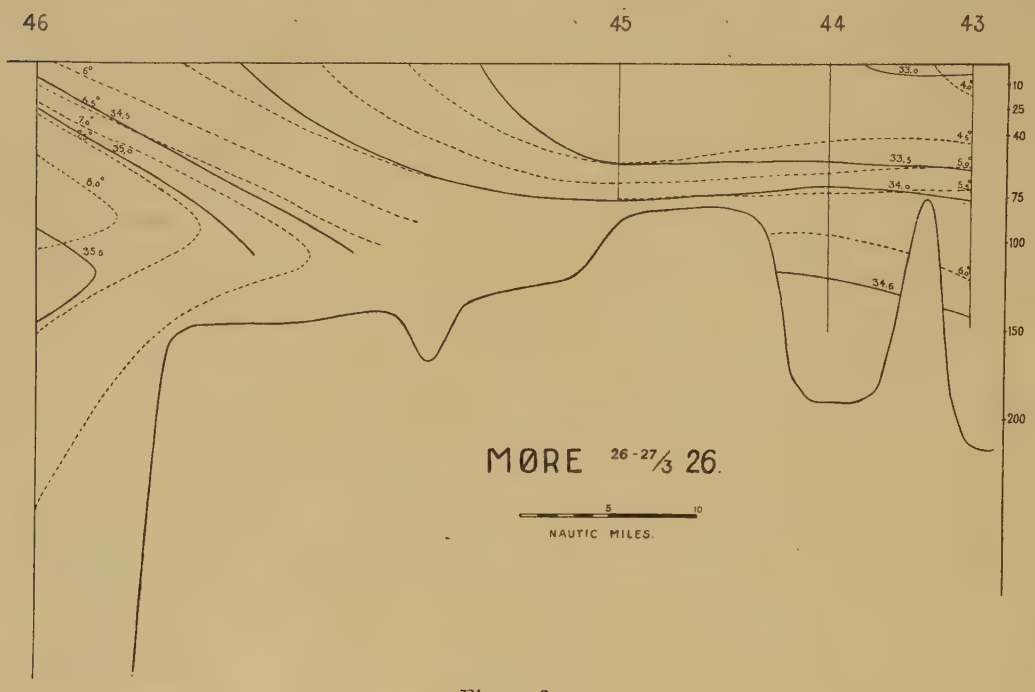


Figure 2.

found to be more contracted towards the coast, the Atlantic water (water above a salinity of 35 ‰) which in all sections forms a nucleus just over the slope, having moved inwards over the shelf.

A study of the temperatures gives the same results in all cases. The curve for 5.5° C. corresponds very closely to the curve for the salinity of 34 ‰ and the curves for 7° and 8° C. with the curves for 35 and 35.5 ‰ salinity. The spawning area of the cod was found to be covered with a layer of water of about 6° C.

From the middle of April there are distinct signs of a change of this condition. At the surface the layers of coastal water begin to flow outwards away from the coast, while in the deep water the Atlantic water approaches the coast. As a consequence of these movements of the layers of water the curves take a more horizontal position, both the curves for salinity and those for temperatures. The layer of coastal water appears then as a thin layer, covering the surface all over the Con-

tinental Shelf and even further out at sea over the great depths of the Norwegian Sea. Figures 3 and 4 illustrate the development of these conditions. In Fig. 4 we observe that the coastal water has been divided into two, conditions which may be connected with an unusually strong north-easterly wind prevailing for months. The temperatures show the usual summer minimum in depths from 30

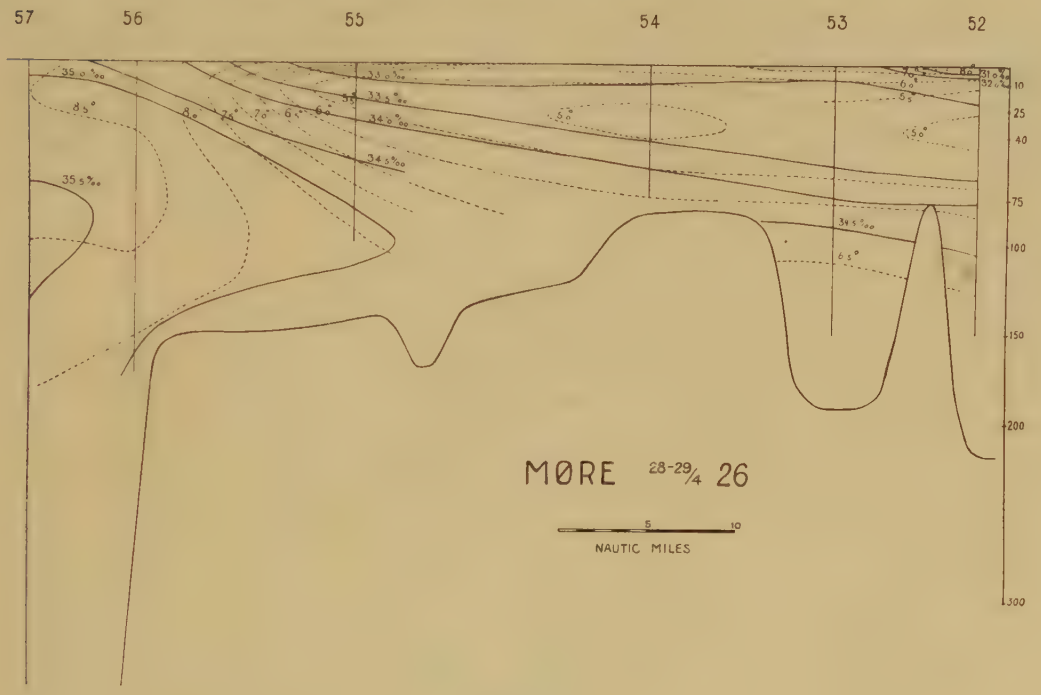


Figure 3.

to 50 m. Fig. 4 shows two such minima corresponding to the splitting up of the coastal layer.

The study of these observations seems to allow of the conclusion that a series of sections taken at short intervals will show important changes within short intervals. These changes, however, may not be of such magnitude that it should be hopeless to describe the characteristics of the hydrographical conditions, e. g. during the spring in the different years. How far this conclusion may hold good can of course only be decided by a continuation of the work. The main question will then be whether the changes within a definite season of one year are of less magnitude than the differences between the different years. During the spring of 1926 a layer of coastal water slightly below 34 $^0/_{00}$ was subject to some but not very great changes. Will there in future years be layers of coastal water of much

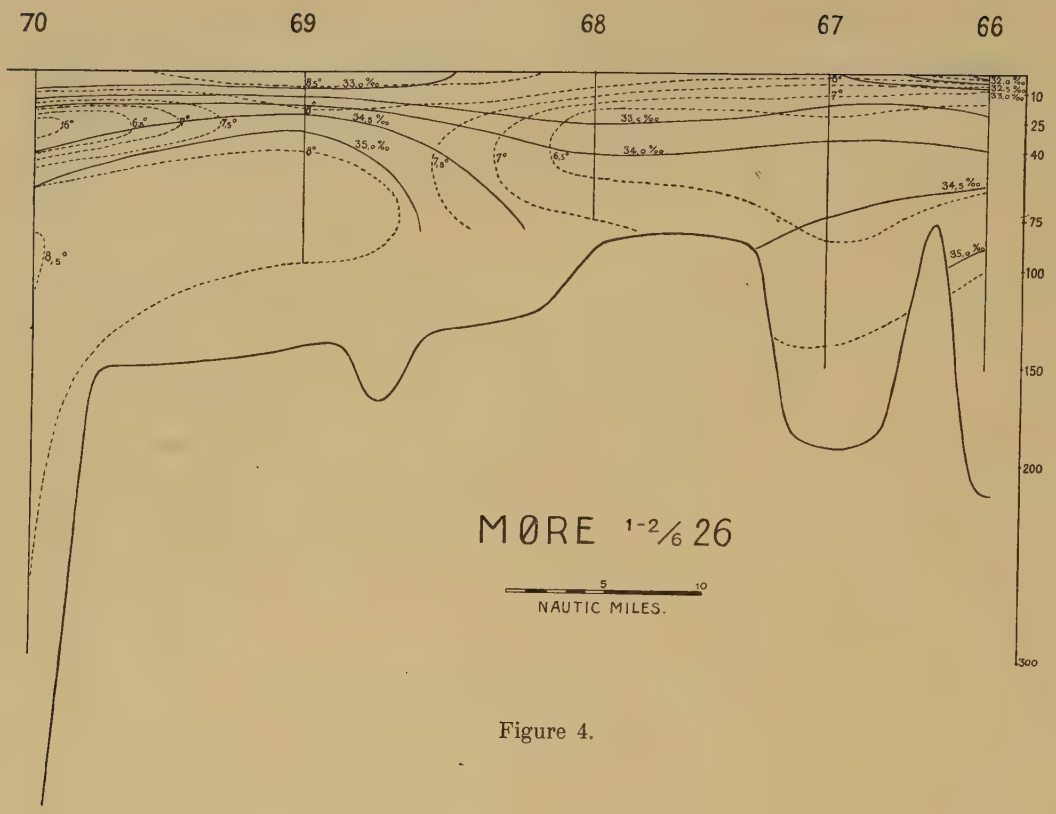


Figure 4.

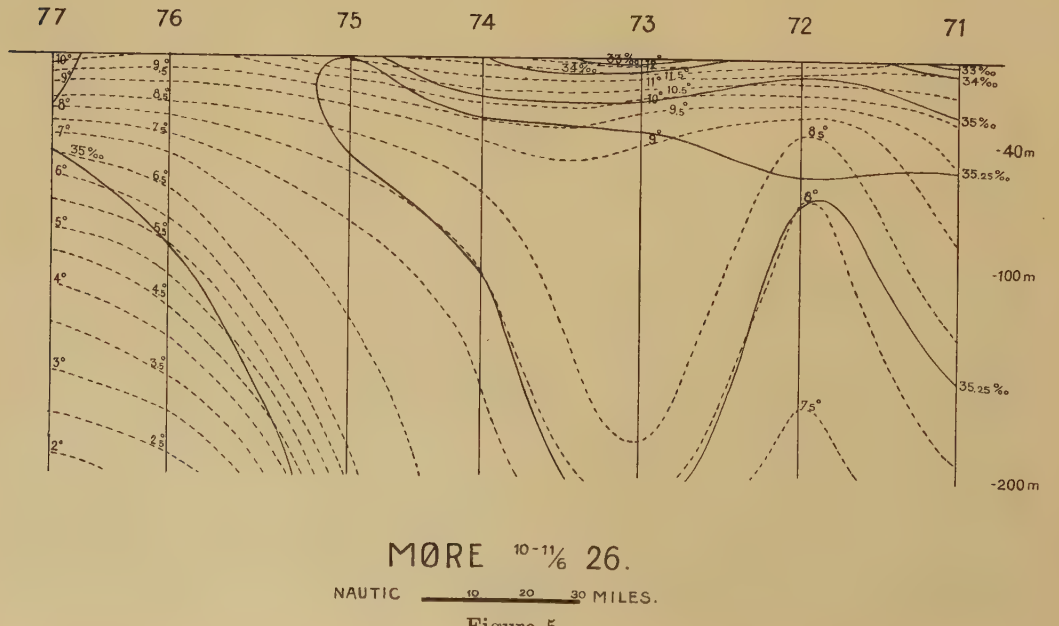


Figure 5.

less salinity and of greater bulk? The spring of 1926 on the west coast of Norway was considered to be an unusually dry season.

Outside the slope we have only very few observations, and only one cruise (10th to 11th of June, Fig. 5). The section represents the conditions on the slope in a north-westerly direction (45 to 218 miles from the coast). We observe the usual uplift of deep water, marked in the curves for salinity and temperatures some 30 miles outside the slope. Further out there is a deep nucleus of water over 35.25‰ and over 8.5° C. of temperature. To the west of this we find the layers of the "Bottlenosefield", where Atlantic water is mixed with waters from the East Icelandic current. We are unable to contribute towards the solution of the question whether a single cruise may suffice for a representative description of the development of the Atlantic current in any given year.

Oxygen.

Unfortunately the samples of oxygen taken on the first cruise were spoiled, a circumstance which is all the more regrettable because the production of phytoplankton had already commenced, although on a relatively small scale. During the cruise 26th—27th March there was a maximum volume of oxygen of 8.30 ccm. in 1 m. in Julsund, and a minimum at a depth of 250 m. outside the Shelf, where there were 6.20 ccm. The maximum in M % therefore lies in 1 m. Julsund, 12.5%. There is otherwise M % over 100 in Buddypet 10 and 25 m. and at St. 46, $50^1/_2$ nautical miles N.W. off the coast at 1 and 10 m. Thus the minimum in M % at St. 46 lies at a depth of 500 m., where it is 89.9 %.

On the following cruise, 9th—10th April, the absolute quantity of oxygen had decreased, but M % had greatly increased, it being over 100 in Julsund and Buddypet, 1.10, 25 and 40 m., at Budgrund Bank and the Shelf at 1.10 and 25 m. The maximum in volume and M % in Julsund at 10 m. is 8.22 ccm. and 114.2 %.

The minimum in volume in Julsund at 150 m. is 6.15 ccm. The minimum in M % in Buddypet at 100 m. is 89.6 per cent.

On the 4th cruise, 28th—29th April both the volumes and the degree of saturation had decreased. We have M % over 100 in Julsund at 1.10, 25 m., in Buddypet and Budgrund at 1 and 10 m., on the Bank at 1 m., on the Shelf at 1, 10, 40 and 75 m., and outside, 50 nautical miles N.W., at 1, 10 and 25 m. The maximum in volume in Julsund at 1 m. was 7.40 ccm., M % 109.1. On the contrary there is a maximum in M % at 1 m. 50 nautical miles N.W., where it is 111.8 % in a volume 7.21 ccm. We have two marked minima in Julsund and Buddypet at 100 m., 5.94 and 5.93 ccm. respectively, both corresponding to 86.7 per cent.

The absolute minimum of the cruise at a depth of 500 m. outside the Shelf was 5.55 ccm., 81.4 %. On the 5th cruise, 12th May, M % was over 100 at depths

of 1 and 10 m. at all stations. At St. 63, $1^1/_2$ nautical miles N.W. of the coast, and also at 25 m. This station has the maximum value of the section at 10 m., 7.55 ccm. — 111.9 %. At this station both volume and M % have increased on the whole, whilst otherwise the remaining stations are somewhat unchanged. M % for the latter, however, decreased at a depth of 1 m. on account of the circumstance that the temperature there had sunk somewhat after continuous cold weather.

On the 6th cruise, 1st—2nd June, M % was over 100 in Julsund, 1, 10 and 25 m. Buddypet at 10 m., and Budgrund 1 and 10 m., the Bank 1.10, 25 m. and the Shelf 1 and 10 m. Julsund is specially noticeable with large quantities of phyto-plankton and at 1 m. 8.14 ccm. 0_2 corresponding to 123.3 % degree of saturation.

We must go as far back as April to find such a large volume. Then too in Julsund we have 1 m. 8.14 ccm. but corresponding to 112.3 %. Otherwise M % in the section does not exceed 105.5 but goes down to 88.1 which is the minimum value, in Buddypet 75 m., 6.01 ccm. 0_2.

The Zooplankton.

During the previous Norwegian fishery investigations occasional observations were made that were of great value for an understanding of the life history of some important plankton animals. Valuable attempts were also made to extend such observations into a systematic study. During recent years, and especially the present one, further contributions have been added to the previous knowledge, and a few remarks on these may be of interest for the existing international cooperation on this subject. I shall mainly confine these remarks to the *Euphausiid Meganyctiphanes norvegica* and the copepod *Calanus finmarchius*.

Many years ago the "Michael Sars" found the floating eggs of Euphausiidae in great quantities just over or outside the slopes of certain banks, e. g. the slope of the North Sea Bank towards the Norwegian Channel. On my expedition with the "Michael Sars" in 1924 I took special care to investigate the question whether it could be considered a typical and characteristic peculiarity in the distribution of these important crustaceans that they were confined or mainly confined to slopes of the Continental Shelf or slopes of banks towards deep channels. The results of the fishing experiments of the "Michael Sars" supported this view in the most extraordinary way. On the slope of the coastal banks of Iceland, of the Faroes, of the Shetland Islands, of the North Sea Bank towards the Norwegian Channel I found a marked concentration of these animals. The catches made on a cruise from the Faroes towards the Norwegian coast passing north of the Shetland, the North Sea, and the slope of the North Sea Bank towards the Norwegian Channel, everywhere confirmed the view that the Meganyctiphanes is to be found on the

slope, and in any case not in great quantities on the banks. Figure 6 gives an illustration of this. It is clear that this experience must have the greatest importance for the understanding of the distribution of many animals which feed on the Meganyc-

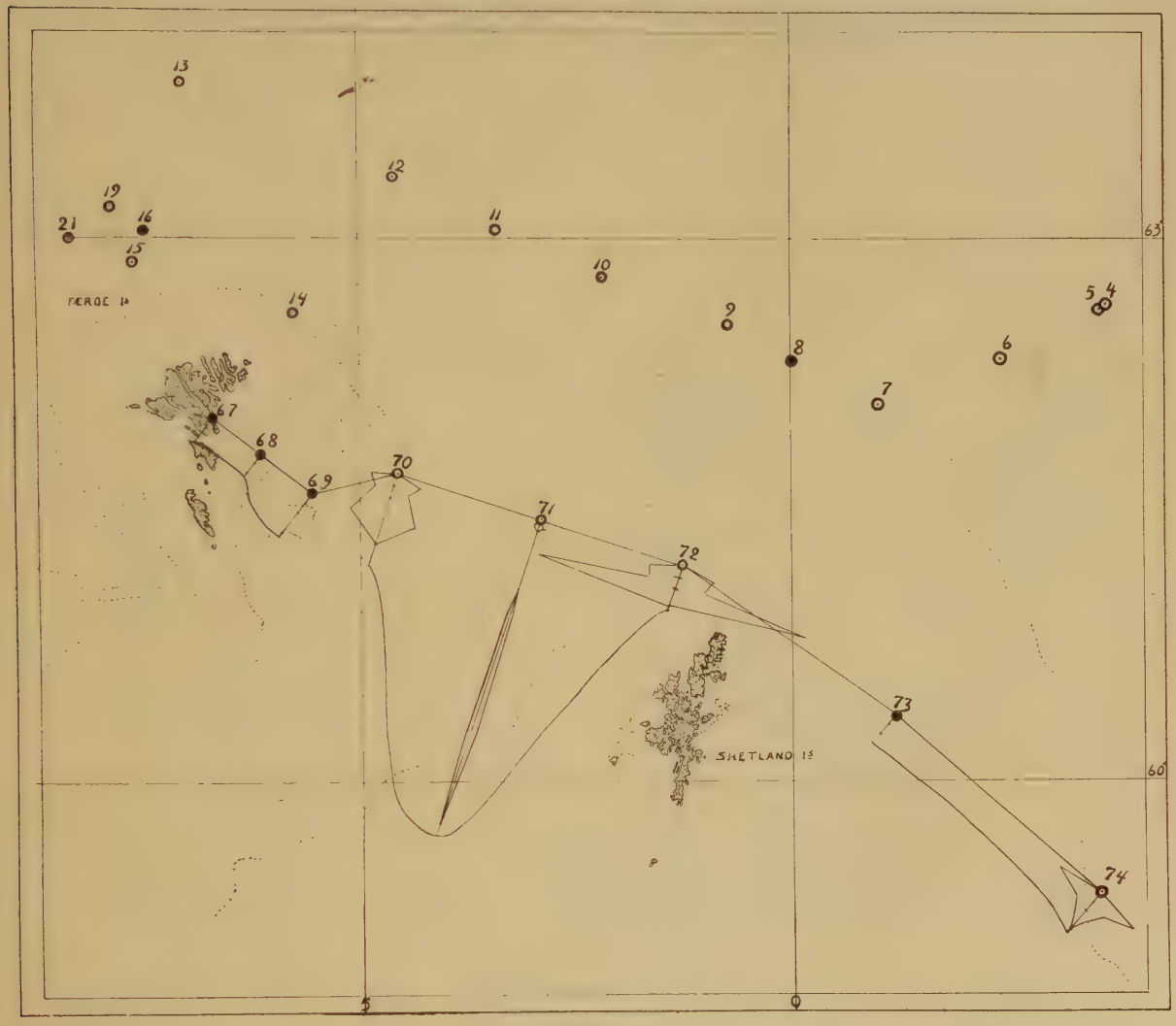


Figure 6.

tiphanes. Of the peculiar migrations of the whales along these slopes Figure 7 gives a very good illustration of the places where the in whales were caught off the Faroes in the year 1924. We know that the spent herrings leave the North Sea Bank or the Norwegian coastal banks and feed on the immense shoals of Schizopods living along the slopes.

The investigations of 1926 started from this experience. The material has

been worked out in detail by Mr. Ruud, who has written a preliminary article (Appendix A) to this report, to which I beg to refer. It appears from this article that there were two different spawning seasons in the Möre district, an early one in

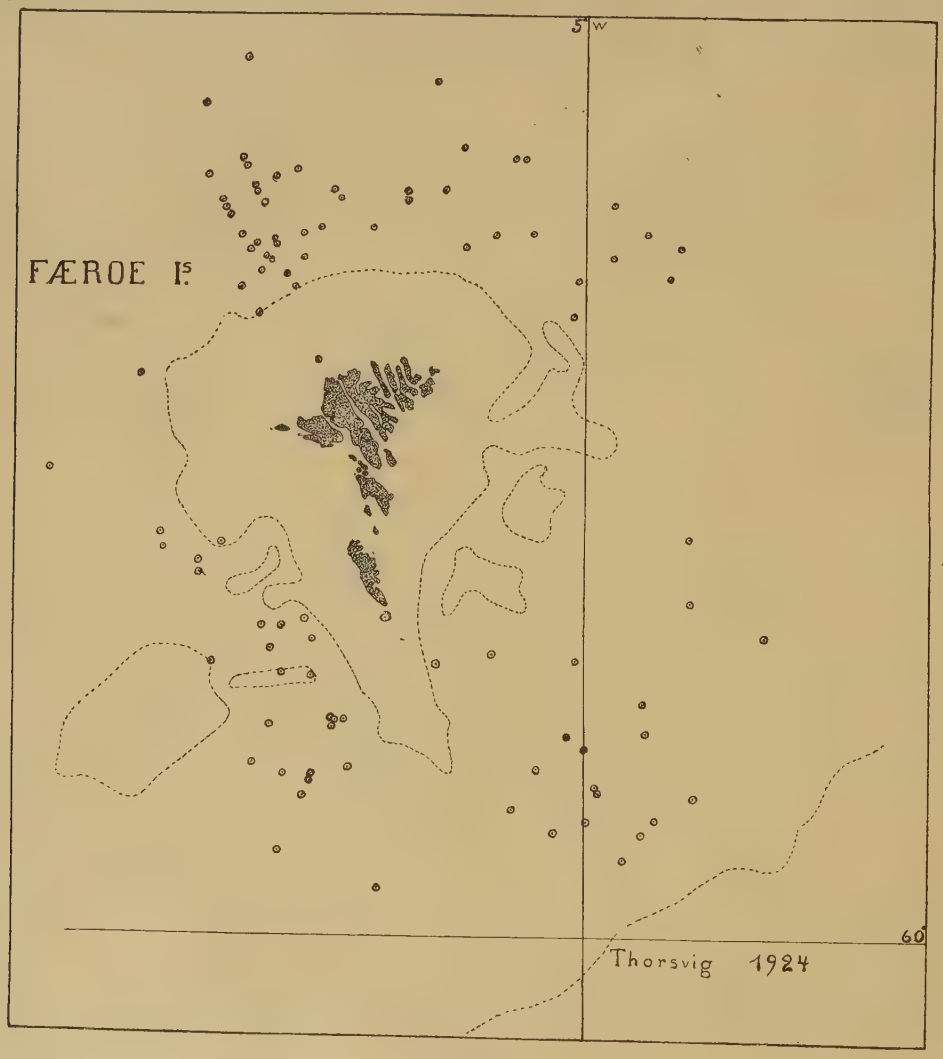


Figure 7.

March for the *Thysanoessa inermis*, mainly taking place in the deep channels of the Continental Shelf, and a subsequent spawning of the Meganyctiphanes in May and mainly on the slope of the Continental Shelf.

During both spawning seasons the whaling took place on the spawning areas, the whales caught having large quantities of Euphausiids (Krill) in their mouths or stomachs. Figure 8 illustrates this.

The copepod *Calanus finmarchicus* has previously been studied in the Norwegian Sea by GRAN and by DAMAS, who have both added most valuable contributions to the life history of the species. It has nevertheless been felt and especially

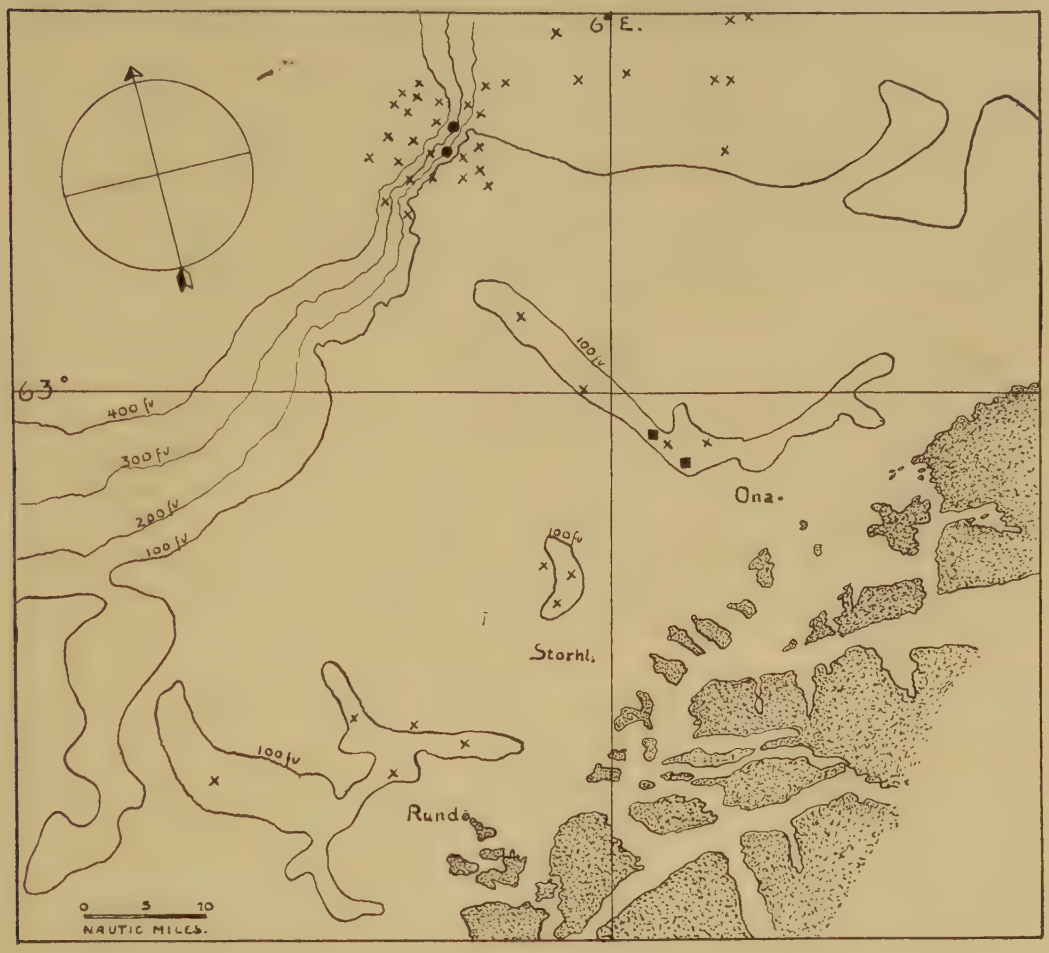


Figure 8.

× Where *Balaenoptera physalus* was shot from February 24th to July 1st, 1926.
■ Where we observed spawn of *Thysanoessa inermis* (Kr.).
● Where we observed spawn of *Meganyctiphanes norvegica* (U. S.).

by these authors, that the material at hand was far too limited both with regard to the area of investigation and the period during which the investigations were made. It will therefore be necessary when circumstances permit to start a very extensive study of the life history and distribution of this species in the Norwegian

Sea. As a preliminary to this the investigations in the Möre district have started to determine the spawning seasons, the life history of the different stages and the relative importance of the species within the community of copepods in the plankton samples. We have for this purpose followed the method applied in the Canadian Fisheries Expedition of 1915, viz. to determine the percentage of the different species and stages in a sample. The details which can be given at this stage of the treatment of the material are reported in Mr. Ruud's paper, to which I refer. It is hoped that the material will allow a comparison with similar material from future years. A study of the available material gives a strong impression of the fact that the *Calanus finmarchicus* is the one and dominating factor in the development of the bulk of the copepod plankton in these waters. The percentage of this species within the samples increases — in the spring — with the increase of the volume of plankton and falls off with them during the summer time.

A close study of the development of the species in relation to the plants on which it feeds will therefore be of great importance for an explanation of many important problems of the biology of food fishes. The material collected during the past year gives much information as to the spawning and distribution of different stages in the coastal waters. One of the most important problems for future research will be the relative importance of the influence of the coastal waters to the influence of the slopes and the vast area which in the above I have called the Bottlenose-field. The small motor boat at our disposal for this work was not suitable for undertaking the extensive cruises which these great problems demand.

Fluctuations of the year classes within the stock of herrings and cod in 1926.

As mentioned above, an attempt has been made to work out the observations collected during the last spring fisheries for the purpose of this report. It has been thought of importance to give an instance of what a speedy treatment of such material may be able to give of information both of scientific and practical interest. The conditions this year have been of particular interest in this respect, as there is one rich year class (that of 1918) in the shoals of spring herrings and another rich year class (that of 1919) in the stock of cod, both having had a great influence on the catches of the fishermen. The appended articles by Mr. Einar Lea and by Mr. Oscar Sund illustrate this in detail. These articles may, it is hoped, serve as an example of a method which may also be applied to the study of the stock of fish in other areas. It seems to me a great object for international cooperation to organise a yearly survey in all the areas of the stock of such important food fishes upon which the great fisheries depend. The appended articles may serve as a starting point for a discussion of this idea.

Sweden.

During May and June 1926, an expedition was made to the North Sea along the southern and western margins of the Norwegian Channel, in order to study the occurrence of schizopods and herring in those waters in summer.

It was found that *Meganyctiphanes norvegica* occurred here over a depth of abt. 150 m.

Fishing experiments for herring were made with drift nets at the same time, and fairly good hauls of herring were also made in those parts where the schizopods occurred. Samples of these herring were taken with a view to investigation as to race etc.

Hydrographical investigations were made at all stations, and a hydrographical section was made diagonally across the channel of Ekersund.

APPENDIX A.

Zooplancton of the Coast of Möre, 1926.

Preliminary Report

by

JOHAN T. RUUD.

A. Euphausiidae. — B. Copepoda.

A. Euphausiidae.

During the cruise of the s.s. "Michael Sars" in 1924 the following were observed in the section Faroes-Shetland-North Sea Shelf (Dr. Hjort's report Fig. 6). The three stations on the banks and towards the Shelf were very poor in plankton and had no euphausiids.

Station 70, just outside the Shelf, on the contrary, was rich in euphausiids. In the vertical hauls there was a relatively large number of specimens, 20 specimens in the haul 50—0 m., and 15 in the haul 100—50 m., but the tow-net hauls that were taken at 5 various depths were especially rich. There were in particular *Meganyctiphanes norvegica*, M. SARS, but also *Thysanoessa longicaudata* and *Thysanoessa neglecta*, KRÖYER.

The station out in the channel between the Faroes and Shetlands has only quite a few specimens of "Krill", but station 72 on the Shelf towards the Shetland Bank again is very rich, with 26 specimens in the haul 50—0 m., 24 in the haul 100—50 m., and 119 in the haul 175—100 m. Station 73 on the Shetland Bank is negative, but Station 74 on the North Sea Slope has "Krill", 40 specimens in the haul 50—0 m., 14 in 100—50 m. and 5 in 200—100 m. This shows that the "Krill" spawns and stays over and outside the shelves of the various banks. The statistics of the catches at the whaling stations in the Faroes also show that the catch of *Balaenoptera physalus* which live almost entirely on "Krill", takes place along these shelves, outside the 100 fathom curve. Fig. 7 (Dr. Hjort's report) gives a map showing the catch in 1924. These observations have been confirmed off Möre, by the investigations of 1925, but especially by those of 1926.

In addition to stations at sea, these investigations have also been made of the contents of the whales' stomachs, which in conjunction with the places of catch kept us à jour with the course of the "Krill".

It has been found that we have to deal with the two species, *Thysanoessa inermis*, KRÖYER and *Meganyctiphanes norvegica*, M. SARS. *Thysanoessa inermis* is a cold water form which reaches its maximum in March, whilst *Meganyctiphanes norvegica* appears later, in May—June.

Thysanoessa inermis spawns in March, especially over the deep channels which go over the bank in a north-westerly direction from Rundö, Storholmen, Ona and several other places. We observed very intense spawning north-west of Ona on the 17th March. We there made a rich catch of mature specimens, eggs and nauplii. The spawning continued for some time longer since we found eggs, but in inconsiderable quantities. The last female with spermatophor was found on the 27th March.

The stages of development of this species appear to keep in the neighbourhood of these channels, in the fjord and on the bank, for Stations A, B and C are always richest in them, particularly Station A.

At the end of March, in addition to eggs and nauplii we also found metanauplius and the 1st calyptopis stage, and at the beginning of April up to the 3rd calyptopis stage of *Th. inermis*. At the end of April we found furcilia stages and in the middle of May cyrtopia stages.

Meganyctiphanes norvegica began spawning at the beginning of May out on Storeeggen (Slope of the Continental Shelf).

On the 8th of May there were taken from the mouth of a whale — *Balaenoptera borealis*, shot on Storeeggen — quite fresh mature specimens of *M. norvegica*. During the cruise on the 12th of May we obtained a number of eggs and nauplii in the samples from most of the stations, but especially from Station E. Intense spawning, however, does not appear to take place before the end of May, for between the 24th May and the 1st June there were shot 11 *Balaenoptera physalus* at various places along Storeeggen, and they all contained large mature "Krill" of the species *M. norvegica*. A tow-net haul on the surface at Station 3, 29th May, gave a rich material of eggs at an early stage of cleavage.

The spawning continued for some time longer, so that in the middle of June there were found a number of eggs together with nauplii, metanauplii and calyptopis stages of *M. norvegica*. At the end of June, at one of the inner stations, there were found advanced cyrtopia stages of *Th. inermis* with nauplii, metanauplii and calyptopis stages of *M. norvegica* up to cyrtopia stages.

Whaling took place from 24th February to 24th March in and around the deep channels on the bank, in the channel north-west of Ona, 15th, 16th, 17th and 18th March, and at the same time the spawning of *Th. inermis* was observed then. From 8th May to 1st July the catch took place on and around Storeeggen,

especially even from 24th May to 1st June. The agreement between the spawning of the *Th. inermis* and of *M. norvegica* and the whaling appears clearly in the map (Fig. 8 in Dr. Hjort's report).

B. Copepoda.

In these investigations we proceeded according to a method shown to us by Professor Hjort, whereby the percentage composition of copepods is determined in each sample by counting, and also by simple measurement there is obtained a relatively comparable value for the volume of each sample. The various copepodits of *Calanus finmarchicus*, Gunn, are determined in accordance with characteristics which were given by Gran, whilst the nomenclature is in accordance with Damas and subsequent authors, naupliis being called stage 0, copepodits stage 1 to 5, and the breeding stage, stage 6[1]). All countings and measurements have not yet been completed, nor have the year's investigations been concluded. In this report there are therefore given no absolute figures, either for composition or volume. Regarding the situation of the stations, reference is made to the report by Professor Hjort.

As early as the middle of March *Calanus finmarchicus* had commenced spawning in the fjord and close over the bank. There were present stages 0, 1, 2, 5 and 6, but at the outer stations only 4, 5 and 6 were present. At the end of April spawning had also begun there, and we then found some from stages 0 and 1. At the inner stations there were at the same time copepodits up to the 3rd stage. At the beginning of April the spawning still continued. At all stations we found all stages from 0 to 6, at the outermost station, however, a strikingly large number of stages 4, 5 and 6 in comparison with the other stages, so that the spawning does not yet seem to have reached its maximum there.

This however occurred at the end of April when there was intense spawning at Storeeggen. On the 29th April we saw on the surface large red patches which contained exclusively *Calanus finmarchicus*, stages 0,4, 5 and 6. At the same time

[1])

Stages	I	II	III	IV	V	VI ♀	VI ♂
Developed pair of legs	2 Rud. of 3rd	3 Rud. of 4th	4 Rud. of 5th	5 pairs of legs			
Segments in metasome	3	4	5 segments in metasome				
Segments in urosome	2	2	2	3	4	4 genital openings	5

there were no nauplii at the inner stations, but a maximum of stages 2 and 3. These conditions had extended to stages 4 and 5 in the middle of May.

There were then no nauplii on Storeeggen, but all the copepodits.

At the beginning of June there was a fresh spawning, simultaneously in the fjord at Station A and on the Shelf at Station E. There were stages 0 and 1, few of 2 and 3 and many of 4, 5 and 6. At Stations B, C and D the stages were from 3 to 6, mostly 5 and 6.

At the end of June there was still spawning on the Shelf at Station E, and also at Stations B and C, but it had stopped at Station A, when we found all stages without nauplii.

This spawning in June, however, was feeble as compared with that in April, both as regards intensity, i. e. relation between mature specimens and nauplii and as regards mass. The volumes of the samples vary greatly from the middle of March to the end of June.

In March, in the upper vertical hauls, 20—0 m. and 50—20 m., from 1 to 5 ccm. At the beginning of April corresponding hauls gave 40 to 50 ccm., and these decreased to 15—20 ccm. at the end of June.

The huge increase in the volume first occurs on the Shelf. At the beginning of April, at Stations A, B, C and D there are in the upper hauls 8 to 10 ccm., whilst at Station F in the haul 20—0 m. there are about 50 ccm.

In the same hauls at the end of April, at Stations A and B there are 15—20 ccm., at Stations C and D 40—50 ccm. and at Station E 15 ccm. This last volume, however, is scarcely representative of the copepods to be found, for we saw large patches of *Calanus finmarchicus* on the surface, both outside and inside where the Station was taken.

The content of other copepods in the samples was somewhat constant, but the percentage figure varied with the invasion of *Calanus finmarchicus*. The predominating species are *Pseudocalanus elongatus*, Boeck, *Microcalanus pusileus*, G. O. Sars, and *Oithona similis* and *O. spinirostris*, Claus. These copepods constitute together 80—90 per cent. of the number in the samples from the middle of March. The percentage figure then falls simultaneously with the increase in volume. At the end of March there are 70 per cent., at the beginning of April 40—50 per cent. and at the end of April 10—20 per cent. of these copepods in the samples. This corresponds to the maximum values in volume, 40—50 ccm. With decreasing volume the percentage figure again rises to 50—60 per cent. at the end of June. During the whole of that time there are many micronauplii and copepods, especially *Pseudocalanus elongatus*, but the spawning appears to have its maximum in March.

The distribution of these copepods according to depths is normal, *Pseudocalanus elongatus* and *Oithona similis* in the upper, *Microcalanus pusillus* and *Oithona spinirostris* in the deeper hauls.

In addition to these copepods there are also present the two acartia species, *Acartia longiremis*, LILLJEBORG and *Acartia Clausii*, GIESBR.

These are not common until the beginning of April. From April—May there also commonly occur *Temora longicornis*, MÜLL. In addition there also occur, but in inconsiderable quantities, a number of larger copepods in deep hauls in March, *Calanus hyperboreus*, KRÖYER, in March and onwards, *Euchaeta norvegica*, BOECK.

Metridia lucens, BOECK, is almost always present, *Metridia longa*, LUBBOCK, not until later on.

APPENDIX B.

Investigations on Norwegian Herrings.

Preliminary Report

by

Einar Lea.

During my absence from Bergen, Herr Th. Rasmussen, in collaboration with Herr P. Bjerkan, has made collections of material from the large herring fishery on the coast of Norway, thus maintaining continuity in the work of observation which was commenced in 1907 when the first samples of Norwegian spawning herring (Norwegian spring herring) were examined for age determination.

Furthermore, additions have been made to the material collected from time to time — and regularly since 1920 — for investigation of the stock of young herring on the coast of Norway.

A great part of the material thus procured, consisting of measurements, weights etc. and scale preparations for determination of age and growth, has been examined with great skill by Herr Rasmussen for age; some of it I have dealt with myself. There is still a great deal to be done, before the entire material of observations can be brought into shape so as to permit of a comprehensive description and the conclusions to be drawn from the same. It is possible, however, to put forward some results of a very simple treatment of that part of the material which has been sufficiently examined up to date.

The observations regarding age of the adult, mature Norwegian herrings are shown summarily in Fig. 1, giving in graphical form for each year from 1907 onwards, the percentual age distribution in the samples of adult herring taken in the course of the so-called spring herring fishery. That is to say, the figure refers to catches of spawning fish — or those ready to spawn — the majority of the hauls being made with shore seine or purse seine in the coast area where the herring come in and spawn. Samples of the so-called large herring i. e. adult herring taken earlier, before they are ready to spawn, are not included, partly because their

representative value, owing to the form of implement used (drift net) cannot be considered as equal to that of hauls made with the fine-meshed seine; partly also because the age determinations for these samples are not of the same value as those for the spring herring. This is due to the fact that with the samples of large herring, it is often impossible to select the scales best suited for the purpose of age determination, as they have fallen off already.

This percentual age distribution is based on several samples for each year, and is thus the result of numerical combination of more or less considerable numbers in the series of age distribution values. As this combination has been made in somewhat different ways for the different years, and as the series for the different years are, owing to the varying character of the material and other circumstances, not of the same value for all years, it is necessary, in order to appreciate the information presented in Fig. 1, to give a brief survey of the material and method of treatment. The material from 1907 to 1910 inclusive is, compared with that of later years, less valuable from the statistical point of view. The samples were few, and in the year 1910 especially, not taken in due relation to the fishery and the natural conditions on which it depends.

During the years 1911—13, the samples were taken in a manner more in accordance with the fishery, and the material is thus rather more valuable. For these years also, however, the number of samples is small. From the ex-

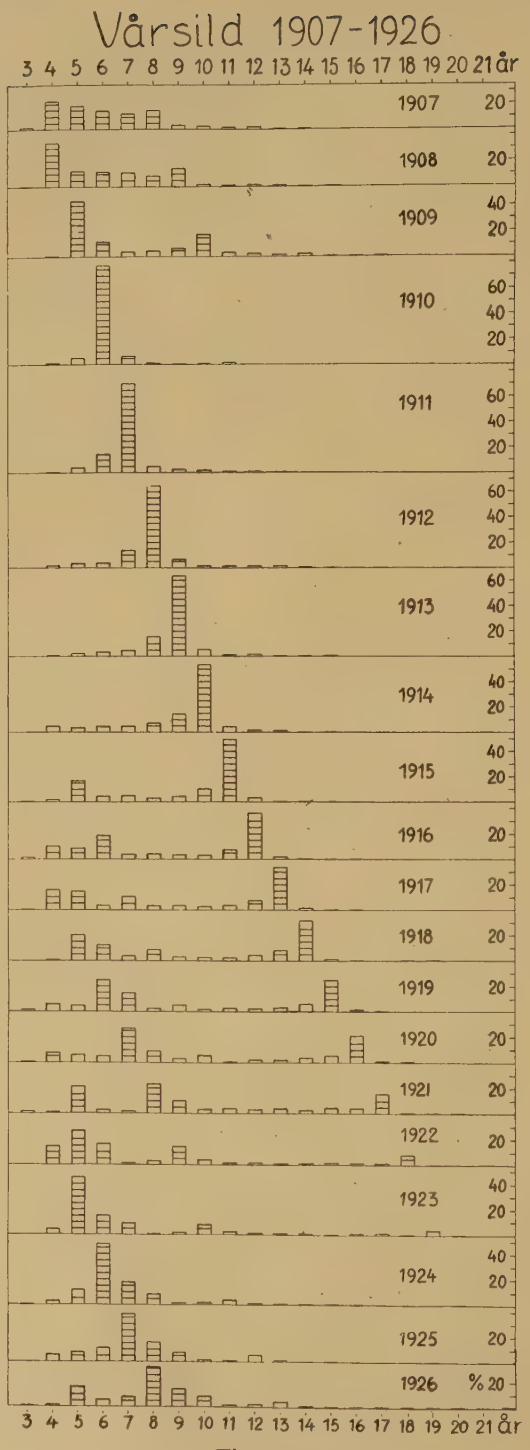


Figure 1.

perience already gained, we can say that the material for each of these years taken by itself is not sufficiently representative to warrant the conclusion that they give an approximately correct view of the age distribution in the actual stock of adult herring. For all these years, the treatment of the figures has been carried out by the simplest possible mathematical procedure. All samples for one year are taken together as one, and the resulting series of figures, showing how many specimens were found in the different age groups, worked out to percentages. More detailed treatment of the observations from these years would, in my opinion, not be worth while, and the result of such would lose in what we might call the direct and immediate value of the observations.

In the year 1914 the method was changed, the number of samples being increased, while the number of individuals in each was, for economical reasons, reduced. This rendered it possible to obtain material more calculated to "cover" the masses of herring that came pouring in on the coast, both geographically and in respect of time. We may take it that the material collected in 1914 and later years is of relatively considerable value as representative of the actual stock, and that a really essential improvement in this respect could doubtless be effected by increasing the number of samples and individuals. This, however, would involve the establishment of an extensive system, which cannot be managed at present.

With the improved material from these later years, and with the experience already gained as to the phenomena occurring in the course of the spawning migration to the coast, the question arose as to how the observations for one season might best be summarised, i.e. so as to give a curve for age distribution most nearly representing that which would be obtained from age determination of all the herring spawning on the coast (the actual age distribution of the stock).

Without attempting any justification here of the method selected, it may be as well to mention the circumstances which were mainly taken into consideration. A feature of the material, discernible in Fig. 1, but more plainly apparent on examination of the individual samples, is what we might call the constancy of the relative number of individuals in the older year groups, from 7 inclusive. The proportionate value found for instance by dividing the number of individuals of the 1904 year group by the number of individuals belonging to the 1905 year group in a given year, e.g. 1914, is altogether remarkably constant, and independent of where and when the sample was taken in a season, whether far to the north or far to the south, early or late in the season. It is, moreover, surprisingly constant when we compare samples from two or even several successive years. This latter form of constancy can at any rate be seen to some extent from the figure. The term constancy here is not to be taken as meaning absolute similarity from sample to sample or from year to year between the figures for the proportions, but the fact that such differences as appear do not show any definite tendency to alteration either in point of space (geographically) or in point of time (early or late in the season

from one year to the next). The differences apparent look rather like fluctuations of sampling, just as we should find if we had an urn with a number of balls of different colours, but otherwise alike, and thoroughly mixed, and then took out haphazard samples of some hundreds in order to get at the proportion between the different colours. In other words, these older herring behave approximately as if they were thoroughly well mixed together, so that as far as they are concerned, a sample may be drawn from the bulk when and where we like in the course of a season; we can, indeed, extend the rule to two or three seasons in succession. The definitely pointing difference doubtless found in pencentage proportions for several seasons is, as far as I can see, determined by the errors made in age determinations. The age determination method is of course not infallible, and has its limitations; especially when the scales have a large number of rings close together the number may easily be under-estimated. This would give an apparent alteration in the proportionate values from year to year, especially in the groups of older fish. Taking this into consideration, the above rule will be approximately correct. The explanation of why it should be so can, I think, be stated in two sentences:— 1) The older herring, let us say from seven years old onward, are thoroughly mixed together by Nature, and have no segregative tendency associated with their age. This explains the rule for one season. 2) There is no certainly discernible difference in the mortality between two adjacent year-classes, say within the age limits from 7 to 16—17 years; as to what difference there may be in the older groups this cannot be stated at present. This explains why the proportions are approximately constant in two or three successive seasons.

The above rule, the validity of which must naturally be shown by detailed investigation, points to the following as the most advisable method of numerical comparison of observations from one season, as regards older fish: each sample may be taken simply as a stage in a larger "draw" comprising all samples, and all individual samples can be rolled into one by simple addition. This has been done year by year for the age groups from 7 years inclusive.

Another fact which has proved of decisive importance in determining the method employed, can, without going too much into detail, be described by the explanation which suggested itself to me on considering certain peculiarities of the material.

It would seem as if each winter, two separate hosts of herring came in to the coast to spawn. One consists of fish which have spawned before. The age distribution in this contingent, however, exhibits great resemblance to that for the whole season in the previous year, making allowance for the fact that all individuals are now a year older. So that when we take all samples of spawning herring for one season together, the resulting age distribution will be a prognosis, a year in advance, of the age distribution in this host of herring, which we may briefly describe as the older spawners. The fishermen get into touch with these older spawners

somewhat north of the spawning grounds proper, earlier in the year, and before they have begun to spawn. The whole of the so-called large herring fishery is based on this general migration of the older spawners to the spawning grounds.

The second contingent is made up of herring which have not previously spawned, but are now mature, and about to spawn for the first time (first-spawners, or recruits).

It has happened once or twice, — on the last occasion this spring — that the fishermen have got into touch with this host of first-spawners before the fish were ready to spawn, and earlier in the season than the ordinary spring herring fishery for fish ready to spawn. In these few cases (1916 and 1926) the catch was made farther south than that of the older spawners taken at the same time, which together with other circumstances leads me to believe that the first-spawners come from a summer haunt lying farther to the south and west than the grounds where the older spawners gather after spawning.

As a rule, however, these first-spawners made themselves apparent during the fishery for mature fish, and late in the season, after the older spawners had arrived. The recruiting of that group of the stock which may be called the adults, the intermingling of young first-spawners in this group, thus takes place on the spawning grounds, and during spawning, not in the long interval between one spawning and the next. The age distribution for the host of first-spawners is naturally quite different from that of the older spawners, but there is some suggestion of the auxiliary hypothesis that the age distribution of first spawners also is relatively stable in the season in question. This being so, it should be possible to construct the age distribution resulting from a mixture of the two hosts, when the distribution in each prior to mixing is known. And this works out so neatly that we are, in my opinion, justified in employing the above-mentioned description of the development of the phenomena as basis for the formulation of plans for collection of the material, and for the statistical treatment of the same.

For the collection of material, then, we have the rule that samples should, if possible, be procured from the two respective hosts before they meet on the spawning grounds, and that endeavours should be made throughout the season to cover the catches of the fishermen by samples.

As the accuracy with which the age distribution for the older age groups is reproduced in the collected material is, from the foregoing, merely a question of the number of specimens investigated, the work during process of collection should be so arranged that in determining the size of the samples, this should be taken into consideration as far as possible, while the number of samples and the choice of time and place should aim chiefly at representing in the samples the combinations of mixtures of the two main groups in a numerical proportion corresponding to the size of the catches.

If a collection of material were adequately made on these lines, i.e. if we

had, for every catch unit, e.g. a hundred-thousandth of that unit, then the statistical formation of the material to give an age distribution valid for the season would be quite simple, and consist in a simple addition of all specimens according to age. All samples taken together as one great sample would then be a section of all catches taken together as a total.

In actual practice, it is not possible to collect material in this manner with the limited resources at our disposal. Some parts of the total catch will be over-represented as compared with others under-represented in the material. I have therefore regarded it as a duty, in the statistical treatment, to endeavour to compensate for this disproportion in the representation.

In the course of this work it became evident that it would not pay to go too much into details in this statistical treatment, partly because the material is not extensive enough, and partly because it could be seen that we should not thereby attain essentially more correct or essentially more certain results. Each sample from a season was marked off in its proper place along a time axis. On the same axis, the amount af the catch was noted according to the figures given in "Fiskets Gang", after these had been converted into numbers of herring. Each sample was then given a certain quantity of the amount caught, answering to what had been taken, according to the catch reports, during the time about which the sample was taken. This quantity (expressed in millions of herring) was then used as a weight for the sample, i.e. all relative figures for the age distribution of the sample were multiplied by a figure so chosen that the sum of the new relative values obtained by the multiplication were proportional to the amount of catch assigned to the sample. On adding all samples thus "balanced" and reducing to 100, we obtained an age distribution with regard to which we might hope that the numerical proportion between older spawners and recruits was in better agreement with what the fishermen had encountered in the actual conditions. On the other hand, it was evident that this method of calculation could not be expected to give such true values for the numerical proportions between one age group and another of the older fish, as simple addition is here the best method. Consequently, the relative figures for the older fish were altered in agreement with the results given by the simple addition.

This was the method employed for the years from 1914 inclusive with the exception of 1920, 1921 and 1926, for which years the material has not yet been carried far enough, wherefore only a preliminary simple calculation has been made (as for the previous years). For all years, out of regard to the estimating of the results obtained, simple addition has been made. It was then found, on comparison, that these two methods of treatment gave in all essentials the same results. On considering the results of the simple and the more complicated process for a single year, we may really have some doubt as to whether the latter can really be supposed to be more correct.

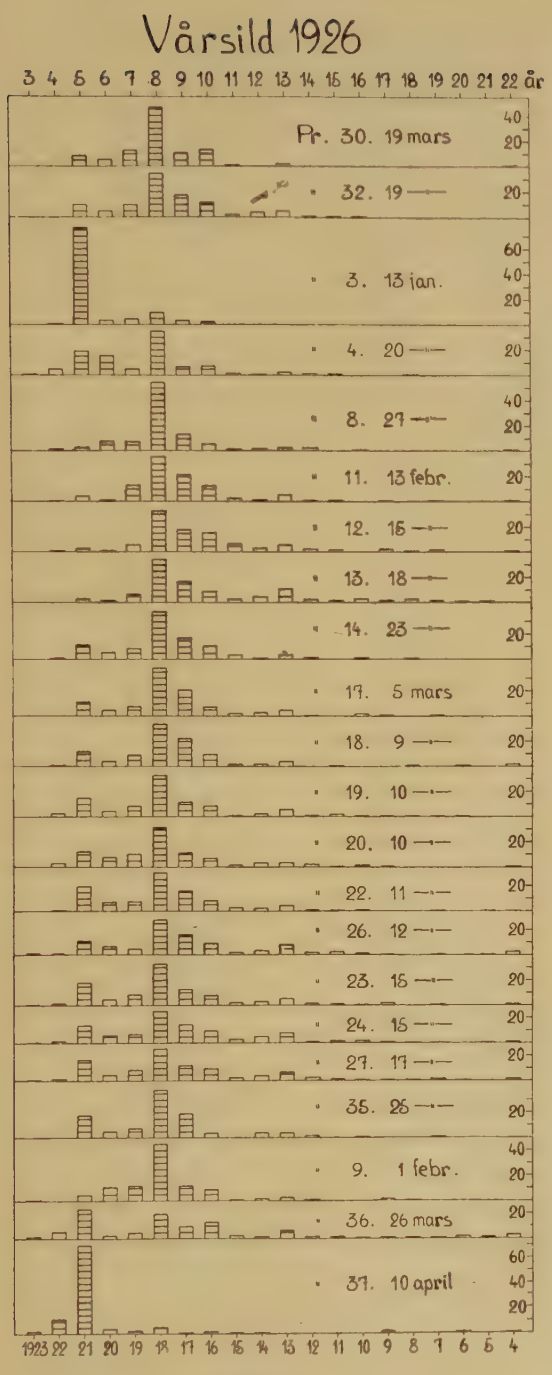


Figure 2.

This doubt, however, disappears when we consider the results for a series of years. The view of the development of the phenomena throughout the years is somewhat different, simpler and more consistent where the material has been treated as above described, with "balanced" samples. This, together with the fact that the results in the main are alike for both methods, I regard as symptoms that the method preferred really has led to better results.

If we now turn to Fig. 1, it seems to me that we cannot avoid the conclusion that the age distributions shown are approximately correct not only for the fishermen's catches, but also for the stock, and that the phenomena which we here observe have really taken place in nature. The assumptions formed from the observations of the first years have in most cases been amply verified, and the prospects of arriving at important results by a rational working up of the material are bright. I am here thinking more particularly of a calculation of the mortality conditions, and associated phenomena. In this connection, it will be of particular interest to investigate the conditions in the years 1920—23.

For if we can, from the material as a whole, deduce an approximately correct mortality or loss factor, then it will at the same time be possible to formulate expressions for the size of the stock in units of the size of the stock in a given year, e.g. the first year of observation. And it will

then also appear whether the rapid alterations in 1921—22—23, when three consecutive year-classes (each year the 5-years old) are of relatively great importance, are due to the fact that the stock of older herring was small, so that even a medium new year-class would be able to make its presence felt, or whether the alterations were due to three successive better or good year-classes, of which the last (the 1918 year-class, 8-years old in the spring of 1926) was the best.

The results of the work of this spring will appear from Fig. 2, showing age distributions of each of the samples hitherto investigated. There are still some samples which could not be included in this figure, and which will supplement the view there given without altering it to any great extent.

The two uppermost samples (30 and 32) together with sample No. 9, the third from below, should be taken separately, as the two former are drift net samples taken off Lindesnes and Egersund, and the last is a drift net sample from the large herring fishery included here by an oversight. For the rest, all three samples fit in nicely among the series when set in their place according to date of capture. Samples 3 and 4 also form an exception to some extent, in as much as they are from drift net hauls. They have been included here because they are important, and show, moreover, by their similarity to later samples of seine-caught herring, that drift net samples may also be of great value despite preconceived ideas as to artificial selection. Fig. 3 is intended to show whence the samples were derived. If we now consider the details in Fig. 2, I think we can read from it the following story. Sample 3 shows that the recruits' contingent had, by the middle of January, already arrived in the vicinity of the coast, and gave rise to some fishery in the Bergen district (while at the same time, the host of the older fish was on the way, providing the large herring fishery farther north). That the host of older spawners had also approached near the spawning grounds in the second half of January is evident from samples 3 and 4, of which the former may be characterised as a mixture of older spawners and recruits, while sample 4 and the following ones down to sample 13 inclusive, may be characterised as pure samples of older spawners. With samples 11—13, the fishery has begun in earnest, in the spring herring district proper, and the samples show that the rule applies also this year, that the older spawners arrive on the spawning grounds before the recruits. Samples 14 to 35 inclusive give a useful view of the recruits' arrival on the spawning grounds in the course of the large fishery, and shows how they mix with the older spawners. There is a distinct tendency in this series; the proportion of recruits increases.

The samples above noted are from places where the main bulk of the fishery took place; the two last samples on the other hand (36 and 37) represent so to speak the conclusion of the fishery, which took place farther to the north. Sample 36 has an age distribution resembling that farther south save that there are rather more recruits. But sample 37 can evidently be said to represent the recruits in an almost unmixed state. This, the last sample of the season, shows a very remark-

Large and Spring Herring
Samples 1926
Sample number
Locality
9
36
37
4
8
Bergen
3
17
22
23
24
26
27
35
13
12
20
19
18
14
11
32
30

Figure 3.

able resemblance to sample 3 from the beginning of the season, and suggests that some of the recruits arrived so late that the older spawners had disappeared, so that there was here no meeting and mingling of the two groups.

On comparing the age distribution of the individual samples with that for the season, as shown in Fig. 1, it will be seen that the latter shows a great resemblance to the distribution in the samples from 10th—15th March (samples 19—24). Altogether, we may say that every single individual sample taken in March during the large fishery on the west coast has a considerable resemblance to the distribution arrived at by taking all samples together — a fact which is worth bearing in mind when estimating the results for the years when the number of samples is small. What we find in the last season, when there was after all a very noticeable renewal by the introduction of first-spawners, may be expected to hold good also in an even higher degree for the seasons when the renewal was, to all appearances, but slight (1911—13).

As shown in Figs. 1 and 2, it is the 1918 year-class that has been the most important for the Norwegian fisheries of large herring and spring herring during the past four years. By comparing the data already given with the results of investigations on young herring on the coast, we obtain some interesting features in the fate of this year-class. Unfortunately, there is no satisfactory material to illustrate the conditions in the year 1919. But the statistics, which show record hauls of small herring (1,100,000 hl) this year, tell their own story plainly enough. Fish of $1^1/_2$ i.e. the 1918 year-class, must undoubtedly have played a predominant part in these hauls.

In 1920, 1921 and 1922, a very considerable quantity of material from catches of young herring was collected. And from this it appears that the 1918 year-class played a very important part in the fishery for young herring in the year 1920, when the fish were in their third year of life. Definite figures cannot be given, but the analyses suggest that the 1918 year-class amounted to something like 40 per cent. of the catch, or possible a little less. But in the following year, 1921, there was very little remaining of this year-class in the catches. Out of abt. 10,000 young herring examined, only abt. 300 were found to belong to this year-class, more precisely, 3.15 per cent. And next year again, in 1922, out of 2665 specimens taken from catches in different parts, only 7 specimens of this year-class were found. We may take it as altogether certain that by far the greatest part of this year-class had left the coastal waters at latest by the spring of 1921. On the other hand, they do not appear in great quantity among the spawning herring before the spring of 1922, and it is further plain enough from Fig. 1 that there were also a considerable number that waited till the spring of 1923 before making their entry among this group of the stock. If there is to be any coherence in the interpretation of these things, we must as far as I can see, conclude that the herring have undergone a stage of development from altogether immature

to fully mature somewhere away from the coastal waters, and in the course of a period which from the data mentioned extends over 1 to 2 whole years, and from other data can amount to three years for some individuals. This assumption, which I put forward in 1921 at a meeting of the International Herring Committee, is thus very nicely supported by the investigations in which we have been able to follow the rich 1918 year-class. It explains quite a number of otherwise puzzling details in the investigation material, and contradicts the view which has of late gained ground among many Norwegian fishermen, to wit that the herring are in process of extermination, being caught when quite small. And it invites us to seek out those regions of the sea where the Norwegian herring spend so long a time outside the range of the present fisheries. From various preliminary calculations, this group of herring in the Norwegian herring population can be of the same order and magnitude as the group of adult fish. The grounds north and east of the Faeroes seem to me for several reasons the most promising for such a search.

APPENDIX C.

The Arcto-Norwegian Cod Population in 1926.

By

Oscar Sund.

As is well known, the cod population of the Norwegian coast north of Cape Lindesnes (Naze of Norway) is effectually separated from the cod populations of other regions except that of the shallow arctic seas north and east of Finmark. These seas form the "grazing grounds", while the coastal waters of Norway between the northern and southern extremities of the country offer the conditions necessary to the propagation of this cod population. A statistical survey of the northern cod population, which may properly be termed the Arcto-Norwegian, should therefore comprise evidence both from the different parts of the coast as well as from the northern waters. Practical circumstances, however, limit the possible extent of the area to be investigated to the Norwegian coasts, but this may also be taken as fairly sufficient, since experience shows that the sizes to be met with far out at sea by trawlers or liners (as well as during the Norwegian fishery investigations in the Spitzbergen waters) do not appreciably differ from the stock accessible to the line fishermen along the Finmark coast, due regard being taken to the special selective powers of the different kinds of gear. In order to obtain comparative samples, the measurement work has been mainly done with line-caught fish, although a fair amount of work has also been done with fish caught in gill-nets. The difference in size between fish caught by these two kinds of gear is by no means considerable, but the nets are to some extent more selective in "favour" of the middle sizes, the standard deviation for net caught skrei (spawning cod) being about 7 cm. against about 10 cm. for line-caught fish. (The middle size of the skrei is roughly 80 cm. and the mesh used for gill-nets is $7^1/_2$ meshes per alen (63 cm.), i.e. 84 mm. between knots.) A further reason for limiting the research to line-caught fish is that lines (in some form or other) are used all along the coast, while nets, though the principal gear south of the arctic circle, and of about equal importance with nets at Lofoten, are scarcely used at all to the north of that district.

The Arcto-Norwegian cod population has been the subject of casual measurements as far back as 1902, and a more regular observation of the stock dates back to 1913, beginning with a series of very instructive marking experiments at Lofoten and Finmark which furnished the proofs of the geographical limitation of the stock as stated above.

Starting in 1913 (southern districts — west coast, principally Møre "fylke" — in 1914) the following numbers of fish have been measured up to this year.

Finmark	185,727 (this year 36,255).
Lofoten	136,398 (this year 24,051).
West Coast	63,629 (this year 17,500).

We will first consider the measurements made this year, represented by the common percentual curves (equal area curves), see Fig. 1.

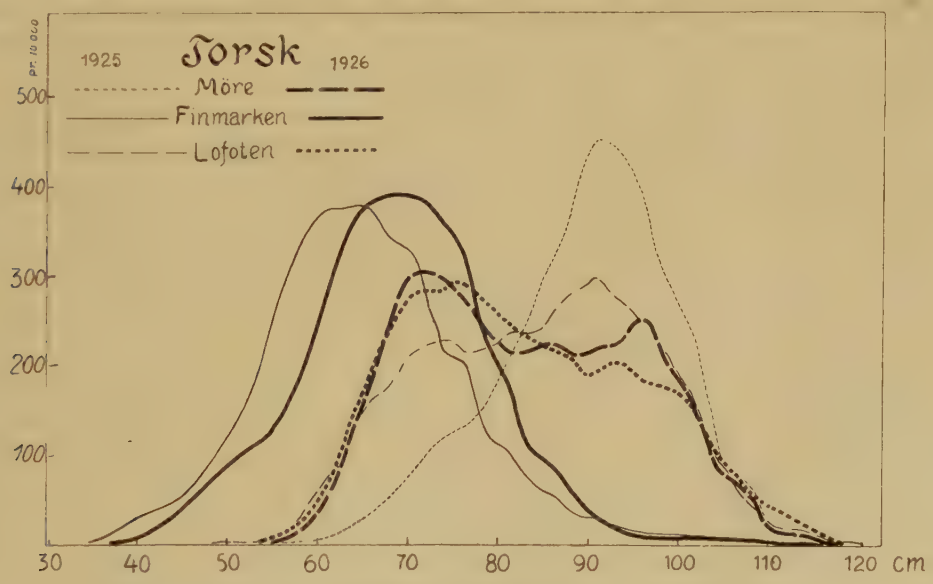


Fig. 1. The Arcto-Norwegian cod population in 1926 (and 1925). Composition in point of size. Ordinates are number of fish in each centimetre class per 10,000 fish measured.

Taking the Finmark stock first, it is noticed that the curve has the same general character of form as in 1925, when the stock consisted mainly of 6 years old fish, the chief difference being a movement of the entire curve about 7 cm. to the right, roughly corresponding to one year's growth. Last year, the year class in question, 1919, made up about 62 per cent. of the entire stock, as found by age determination of scale samples. This year no scale readings have so far been made,

but it may safely be assumed from the curve that no considerable influx of younger fish has occurred.

Turning now to the curves representing the Lofoten stock in 1925 and 1926, it is seen that the remarkable proportion of small fish belonging to the 1919 year class is still more accentuated in 1926, while the left branch of the curve has remained nearly in the same position, thus indicating either a contingent of 6 years fish (spawned in 1920) or a continued influx of 1919 fish. The limited number of scale readings made at the present moment confirm the latter hypothesis. The following is a table of scale readings from Lofoten fish caught during the last four springs, in percentages:—

		Year class.												
Year of capture	?	1920	1919	1918	1917	1916	1915	1914	1913	1912	1911	1910	1909	1908	Total
1923.....	1	—	—	—	2	4	29	14	13	28	4	4	—	1	100
1924.....	2	—	2	2	18	8	33	10	7	14	3	1	1	—	101
1925.....	1	1	18	12	28	8	22	4	2	3	—	—	—	—	99
1926.....	—	4	32	15	30	7	9	2	1	2	—	—	—	—	100

This agrees fairly with the general impression of the curves.

Looking finally at the two curves in Fig. 1 representing the cod caught on the Møre coast (just north of Cape Stat) a great difference is seen between the composition in point of size of the stock in this year and the foregoing one: While the Møre catch (as in all districts south of the Polar circle) was exceptionally large in 1925, consisting mainly of 9, 11 and 13 years old fish, in distinct contrast to the northern districts, this year it exhibited almost exactly the same composition as to size as the Lofoten stock.

So far we have considered only the size of the fish, apart from any quantitative valuation of the relative numbers of fish present in the different areas and accessible to the fishermen.

In order better to appreciate the significance of the figures obtained from measuring the fish, we shall now proceed to consider the material from 1926 by means of the methods described in "Fluctuations in the year classes of important food fishes" by Johan Hjort (Journal du Conseil Vol. I, No. 1).

The main features of that method are, briefly, (1) to represent a certain composition in point of size by a curve, the area of which corresponds to the supposed stock of fish accessible as judged by the catch per unit of fishing (say per man per day) and then (2) to deduct from this curve an average curve formed by adding the greatest possible number of equivalent curves (different months, different years, different districts a. s. f.), or to deduct an equivalent curve (the preceding season f. i.). It will sometimes be found more instructive (3) to divide all the ordinates in a curve by the corresponding ordinates of the normal curve. We then obtain a percentual curve that shows every abnormality of the size-composition in the

most striking manner, excluding everything general and common. (4) From any such percentual curve it will often be found useful to deduct an equivalent curve, e.g. the curve representing the preceding year, in order to get the changes expressed in terms of the average composition.

If the ordinates of the average curve be termed Y, those of consecutive year-curves y_1, y_2, y_3..... we then obtain new curves, the ordinates of which, a, b, c, d may be expressed thus:—

$$a = y_n - Y, \qquad b = y_n - y_{n-1},$$

$$c = \frac{y_n}{Y} \cdot 100, \qquad d = \frac{y_n}{Y} \cdot 100 - \frac{y_{n-1}}{Y} \cdot 100.$$

In fig. 2 we have a representation of the size-composition of the Lofoten fish, with ordinates of the types c (left) and d (right) for the years 1925—26.

The main features of the 1926 curve are seen to be the same as those of the 1925 curve, only they have shifted somewhat to the right. The surpluses both of the lesser sizes and of the large are, however, greater in 1926 than in 1925. The curve is not difficult to understand as far as the smaller sizes are concerned, as it was to be expected that the 1919 fish, when 7 years old, would return in greater force than when only 6 years old, an age when certainly only a very limited percentage of the skrei have attained the size necessary for reproduction. But that also the old fish, mainly of the year classes 1917 and 1915 should be so numerous, seems to show that the skrei population does not always appear in the fishing records in quantities representative of its aggregate strength.

The same impression is still more enhanced when looking at the corresponding curves from the Møre district (Fig. 3). In this district (as on the whole coast S. of the arctic circle) the 1925 fishing was a complete failure, most sizes of fish except the very biggest being caught in numbers of up to 60—70—80 per cent. below the average number (100 per cent.). In 1926 the fishing was very good in this district, and this was not only occasioned by the influx of 1919 fish (which appeared one year earlier at Lofoten) but also by a good quantity of big fish, the sizes above 1 m. length being caught in numbers more than 150 per cent. above the average.

Turning lastly to the Finmark fish, again, it should be born in mind that the present year turned out the heaviest catch on record, 102 thousands of tons as against 99,000 tons in the second best year (1912), and the vast majority of this big catch is undoubtedly of the 1919 brood. Unfortunately, only a part of the measurements are at hand at the time of writing and it is therefore impossible at the present moment to get a complete view of the stock through the season, but the reports of the fishery officers do not indicate any definite change in the size of the fish during the season, and the size composition shown in Fig. 1 may therefore be taken as fairly representative of the season.

If we compare this curve (Finmark 1926 in Fig. 1) with the corresponding curve for West Lofoten, where the small fish were most preponderating, it will be seen from Fig. 4 that the difference in favour of Finmark is greatest for the

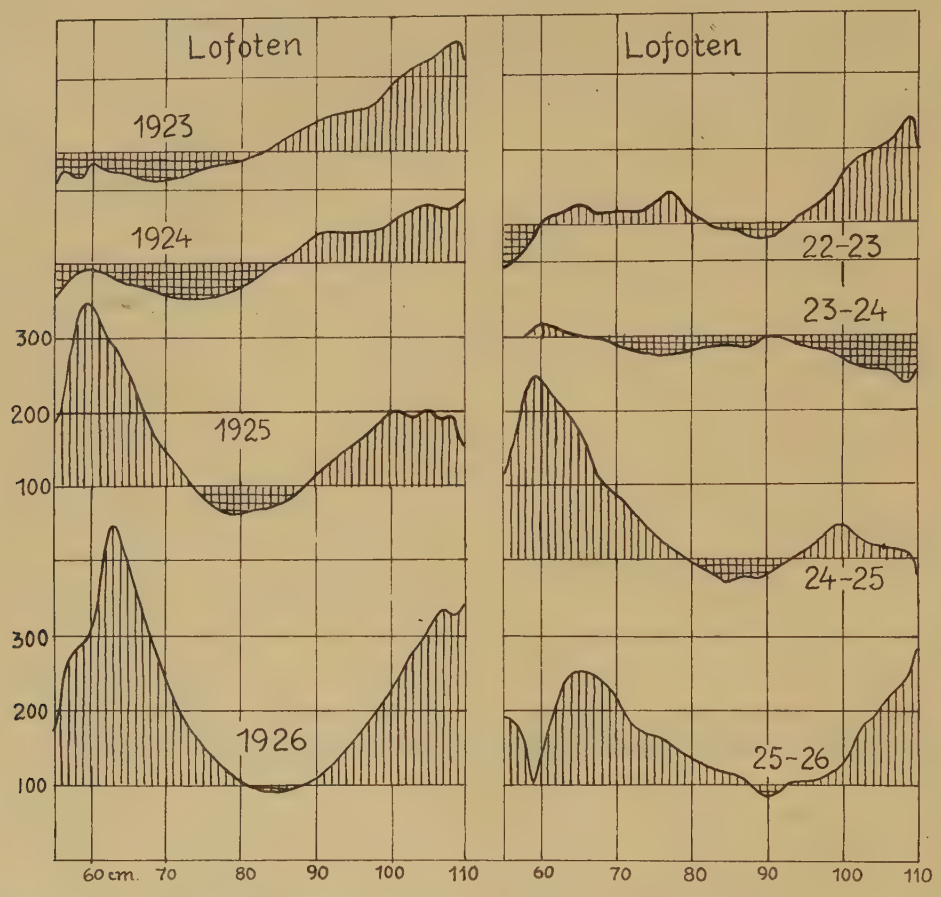


Fig. 2. The Lofoten catch of skrei (mature cod) 1923 to 1926. Ordinates in the left row of diagrams represent number of fish caught per man per day of each centimeter class in per cent. of the average corresponding number caught during 1913 to 1925. Ordinates in the right row of diagrams represent differences between the figures embodied in the left row for one year and the preceding one, thus showing the change from one year to another. (The change from 1925 to 1926 is marked in the figure by "25—26").

sizes about 62 cm., or exactly the size which shows the greatest relative surplus in the skrei districts (se Figs. 2 and 3). As the measurements represented in Fig. 4 were made early in the season (late March and early April) they cannot comprise any great number of fish returned from the spawning grounds, and we are there-

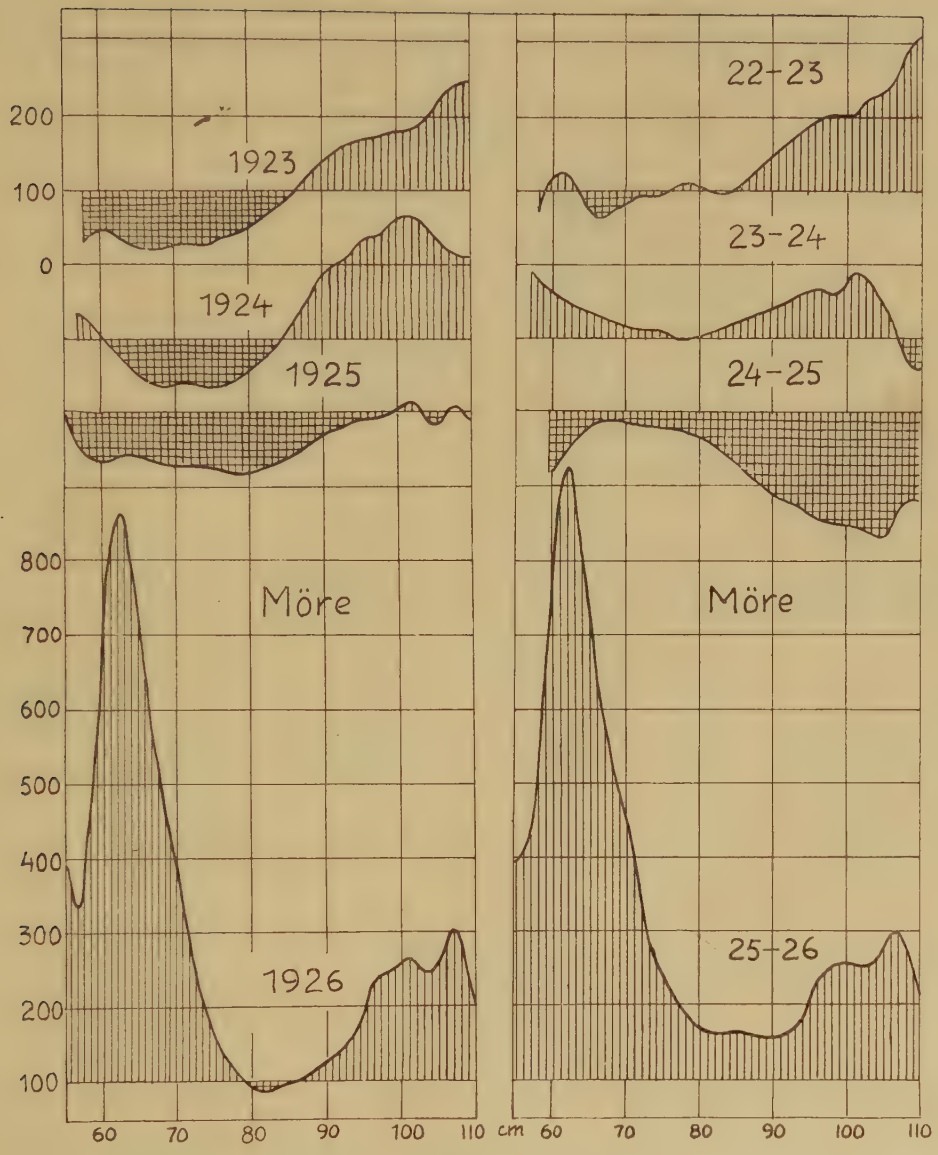


Fig. 3. The Møre catch of skrei in the years 1923 to 1926. Ordinates as in fig. 2.

fore led to the conclusion that only a part, perhaps not half, of the 1919 brood visited the spawning grounds this year.

The probable forecast for the future yield of the skrei fisheries based on the foregoing consideration seems to be a continued good supply of the 1919 brood

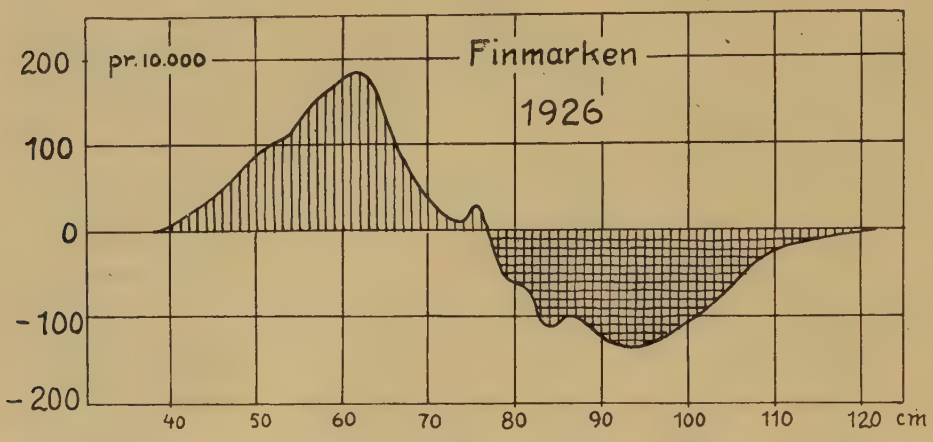


Fig. 4. The Finmark fish caught during the early part of the Finmark spring season 1926 compared with the West Lofoten cod from the same year. Ordinates represent the number of fish in each centimeter class pr. 10,000 measured in West-Lofoten 1926 deducted from the corresponding figures for Finmark.

for a few years to come, till about 1929 or 1930, when this year class will have attained an age of 10 or 11 years. At this age the number left may be expected to become small, according to the experience from good year classes previously known: 1900, 1904, 1912, 1915.

NORTH WESTERN AREA

1925—1926.

By

Johs. Schmidt.

The following work has been carried out by the various countries:

England. General statistics from the North-western Area.

Owing to the strike, it has been impossible to carry out the contemplated fish measurements in Iceland waters during May, as all fish measurers were seconded to help the Inspectors in the necessary work of coal rationing etc.

France. No report has been received.

Norway. Arrangements have been made with the leader of the great fishery expedition from Aalesund to the Greenland Banks (s.s. Helder) for the collection of halibut otoliths, with scale samples and necessary data, from the banks west of Greenland, and for measurements of temperature in connection therewith.

Scotland.

1) General statistics from Iceland and the Faroes for 1924.
2) Haddock measurements and scales from Faroe and Icelandic commercial catches landed at the Aberdeen Market.
3) Age determination and growth calculations from the voluminous haddock scale material collected by the "Dana" at Iceland in 1924 and 1925 and by the "Explorer" in 1925.
4) Age determination of the Lemon Sole material collected by the Research Vessels "Dana" and "Explorer" at Iceland and the Faroes, and by Mr. Bjarni Saemundsson at Iceland.
5) Preliminary work on the general biological material collected by the "Explorer" at Iceland in 1925.
6) Hydrographical-biological investigations in July 1926 on the boundary region west of the Butt of Lewis.
7) Collection of small plaice from the west of Scotland for racial investigations.

As to the planned trawling investigations, it may be possible to make a trip to the Faroes before the end of the year.

Denmark. Denmark's contribution to the work of the North-western Area Committee comprises, firstly, a three months' cruise to the Faroes and Iceland, from 18th May to 15th August, leader: Å. V. Tåning, M. Sc.; furthermore, hydro-

graphical and biological material has been received from the Danish Inspection vessels "Fylla" and "Islands Falk", as well as from the Icelandic Inspection vessel "Thor". And finally, marking experiments with cod have been undertaken by various qualified persons.

In Faxe Bay, West Iceland, the hydrographical observations commenced in 1924 have been continued throughout the year by the above mentioned vessels at a fixed station off Akranes; in addition to these, continuous hydrographical observations have been commenced from a new station north of Skagi.

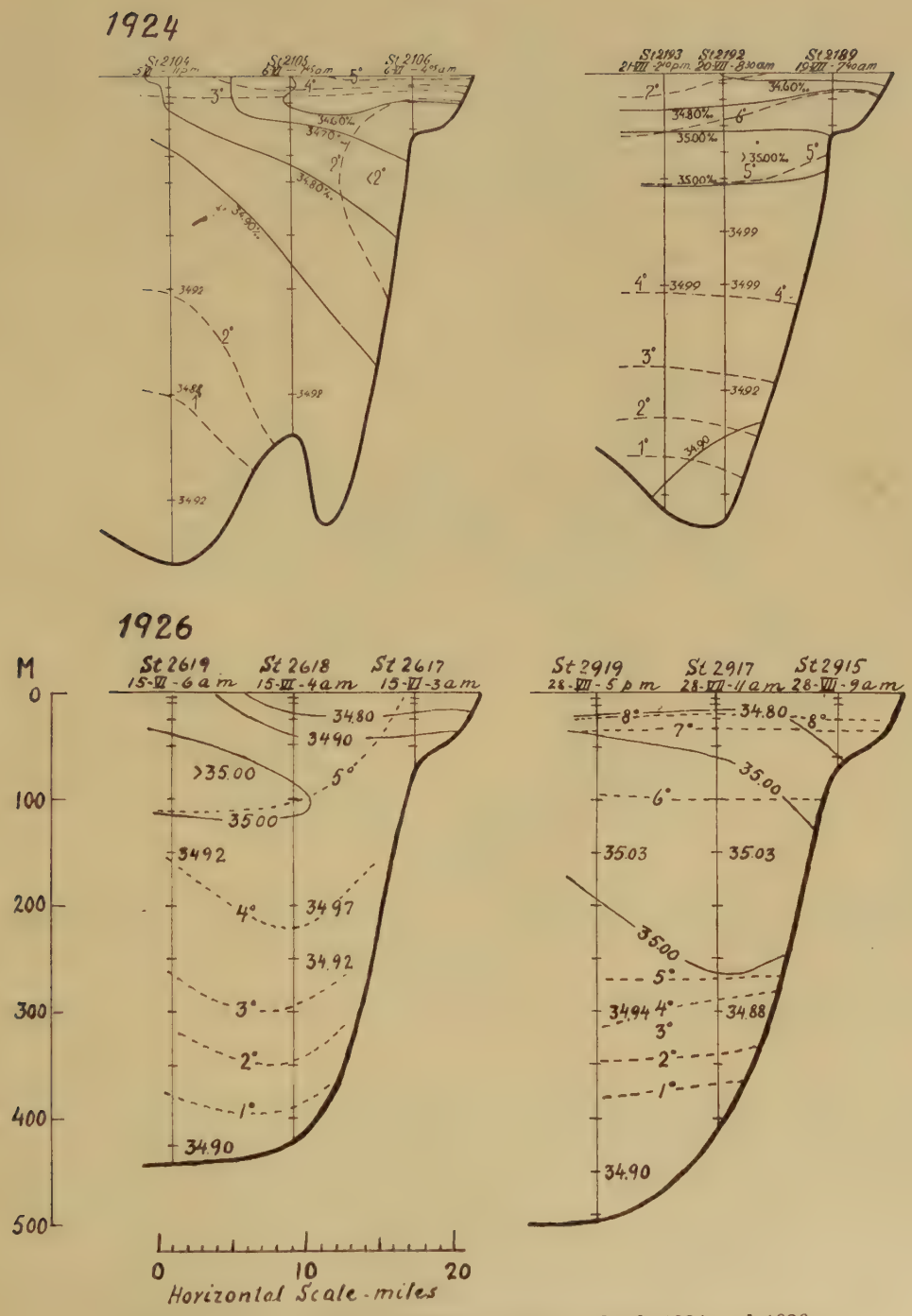
During the cruise of the "Dana" in May—August 1926, regular hydrographical observations were taken as usual in connection with the biological stations. In June (11—17th) the "Dana" circumnavigated Iceland from Ingolfshöfdi eastward and northward round to Reykjanes, and later, in July, investigations were made along the west, north, and east coasts, thus providing material for the study of hydrographical conditions on the coastal banks during that period.

The investigations showed that the temperature, especially off the north coast, was considerably above the values previously noted at the times mentioned; this applies both as regards vertical and horizontal measurements. Two hydrographical sections from the north coast, outside Siglufjord, on the 15th June and 28th July, may be quoted as instances of the hydrographical conditions in a vertical direction, showing that the warm water goes far deeper down than for instance in 1924; these two sections are directly comparable with the corresponding sections from the same locality in 1924 as shown in the Report of the North-western Area Committee for 1924 and 1925 p. 75: J IVa (5—6th June) and J IVb (19—21th July).

In all previous years for which observations are available, the horizontal distribution of temperature along the north coast in the first half of June shows the 4° curve situate about Cape North, i. e. near the west coast (see *inter alia* Report 1924—25, Fig. 61, p. 142); the investigations of 1926 however, show this curve shifted right over almost to the east coast, viz. a little east of Rifstangi.

The distribution of Cod fry was found to correspond to these exceptional hydrographical conditions. On the north coast, great quantities had drifted round Cape North, and larvæ were taken off Skagi (Coalfish even as far as outside Siglufjord). The largest numbers of cod larvæ were taken, as usual, in the waters off Staalbjerghuk (65°26′ N. 24°30′ W.), where a 15 minutes' haul with a 2 m. stramin net, made on the 16th of June, yielded 5295 larvæ of *Gadus callarias* alone (Average length of 304 specimens = 10.23 mm.).

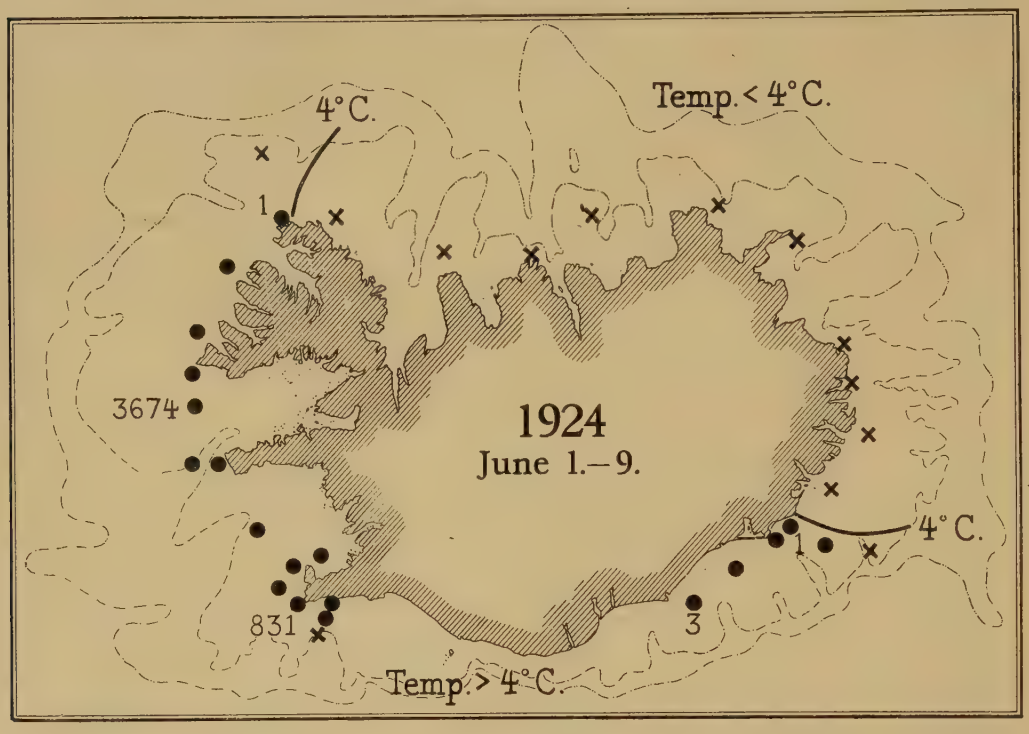
No Herring fry were found in Iceland waters during June, as the young of the spring-spawning fish were evidently too big now to be taken in the pelagic implements used; in July, the "Dana" did not visit those places where the young of the summer-spawning herring might be found. In the Faroe waters, towards the end of May, tiny herring fry were found, as usual, in certain fjords (Skaalefjord, Trangisvaagfjord etc.). Spawning was not yet completed by the end of May, about $^2/_3$ of the females in a herring sample from Funding Fjord (24th May) had still running roe.



Hydrographical sections off Siglunes, North Iceland. 1924 and 1926.

As regards pelagic fry of the Halibut, only a single specimen was found in mid June, off West Iceland (64°20′ N. 23°18′ W.); this is entirely in agreement with previous experience (see Report 1924—25, p. 19, Fig. 4).

Pelagic investigations were made as usual on the cruise in the northern North Sea, as also between Shetland and the Faroes. About the 20th of May, no trace of *Salpa fusiformis* and organisms following this purely Atlantic species was



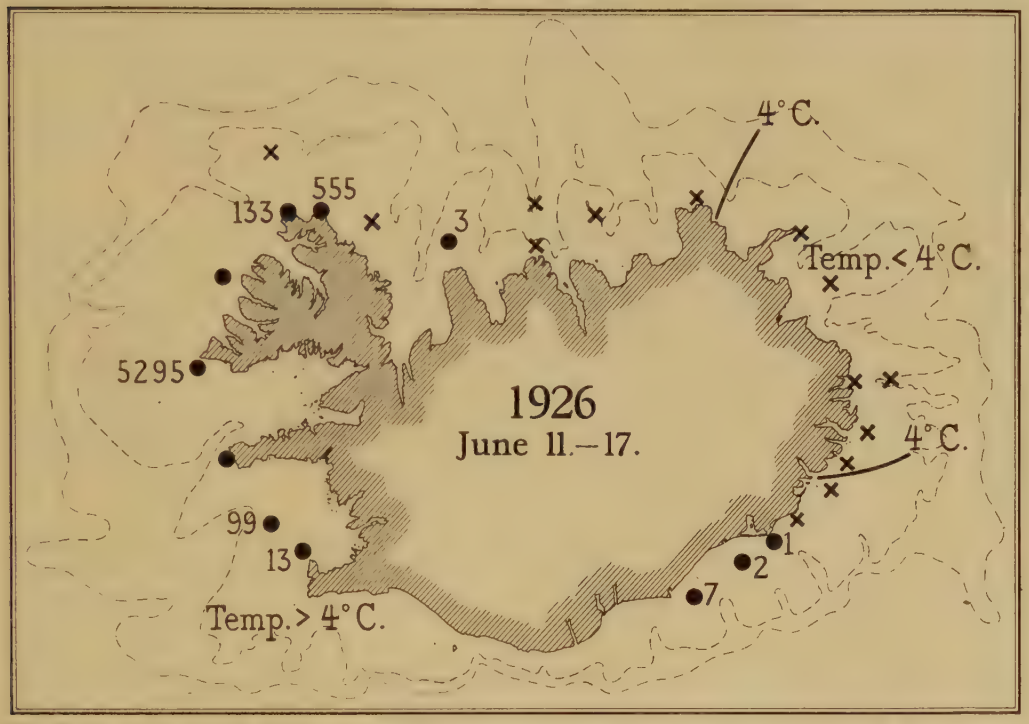
Distribution of pelagic cod fry round Iceland, according to the investigations of the "Dana" June 1924.

● Postlarval stages of Cod (*Gadus callarias*); number of specimens per 15 minutes' haul with 2—meter net indicated at some stations.
× No specimens taken.

found; about the 10th of August, when the "Dana" once more passed through these waters, *Salpa fusiformis* and other organisms of purely Atlantic origin were found, though dying off in the northern North Sea. With the evidently pronounced inflow of Atlantic water, *Leptocephalus brevirostris* had moved in to the southern side of the Faroe-Shetland Channel in very large numbers; up to 86 specimens could be taken in a haul of one and a half hour's duration with the 2 m. stramin net at Stat. 2998, 60°35′ N, 3°45′ W. By far the greater number (abt. 89 per cent.) were in the metamorphosis stages, II and III especially.

Both in Icelandic and Faroe waters, material was collected, as in previous years, of the younger year classes of cod, coalfish, plaice etc. for continuation of the racial investigations already commenced, and for study of the variations in

numerical occurrence of the younger year groups. A single example of the last-named investigations may be quoted. As usual, the I-group of the cod was numerically poor off the west coast of Iceland; and on the east coast, where this group is found as a rule in very large numbers, there were also but few this year; the II-group on the other hand, (which in 1925, as the then I-group, was very numerous e. g. in Seydisfjord, see Report 1924—25, p. 146, Fig. 63) was more richly repres-



Distribution of pelagic cod fry round Iceland, according to the investigations of the "Dana" June 1926.

● Postlarval stages of Cod (*Gadus callarias*); number of specimens per 15 minutes' haul with 2—meter net indicated at some stations.
× No specimens taken.

ented than usual, amounting in June to as much as 85 per cent., as against abt. 12 per cent. of I-group fish.

Intra- and extra-territorial Trawling was also carried out this year, as in 1924 and 1925, at fixed stations.

In Faxe Bay, the results for 1926 agree with those of previous years; the quantity of fish however, especially of plaice, was less than in 1924 and 1925. The trawling was carried out at the end of June and during the first few days of July, and it would seem as if the plaice in particular were moving in to the bay in somewhat greater numbers about the 1st of July.

The results of this year's investigations, compared with those of the previous years, as regards Plaice and Haddock, will be seen from the following table:

Faxe Bay	Intraterritorial			Extraterritorial		
Pleuronectes platessa	Average size in cms.	No. per trawling-hour	Trawling-hours	Average size in cms.	No. per trawling-hour	Trawling-hours
1924 (June)	32.4	**106.8**	32.75	33.9	**14.5**	51
1925 (abt. August 1.)	29.3	**155.8**	20	33.5	**4.3**	19
1926 (June)	31.3	**41.0**	31	33.2	**2.5**	26
Gadus aeglefinus						
1924 (June)	27.9	**223.4**	32.75	35.0	**20.9**	51
1925 (abt. August 1.)	28.6	**198.1**	20	30.9	**9.6**	19
1926 (June)	28.7	**123.7**	31	29.1	**3.5**	26

In addition to the trawling grounds previously worked, one or two others — intra- and extra-territorial — were tried this year, the results being similar to those from the grounds worked in 1924 and 1925. The extra-territorial grounds are constantly visited by English trawlers.

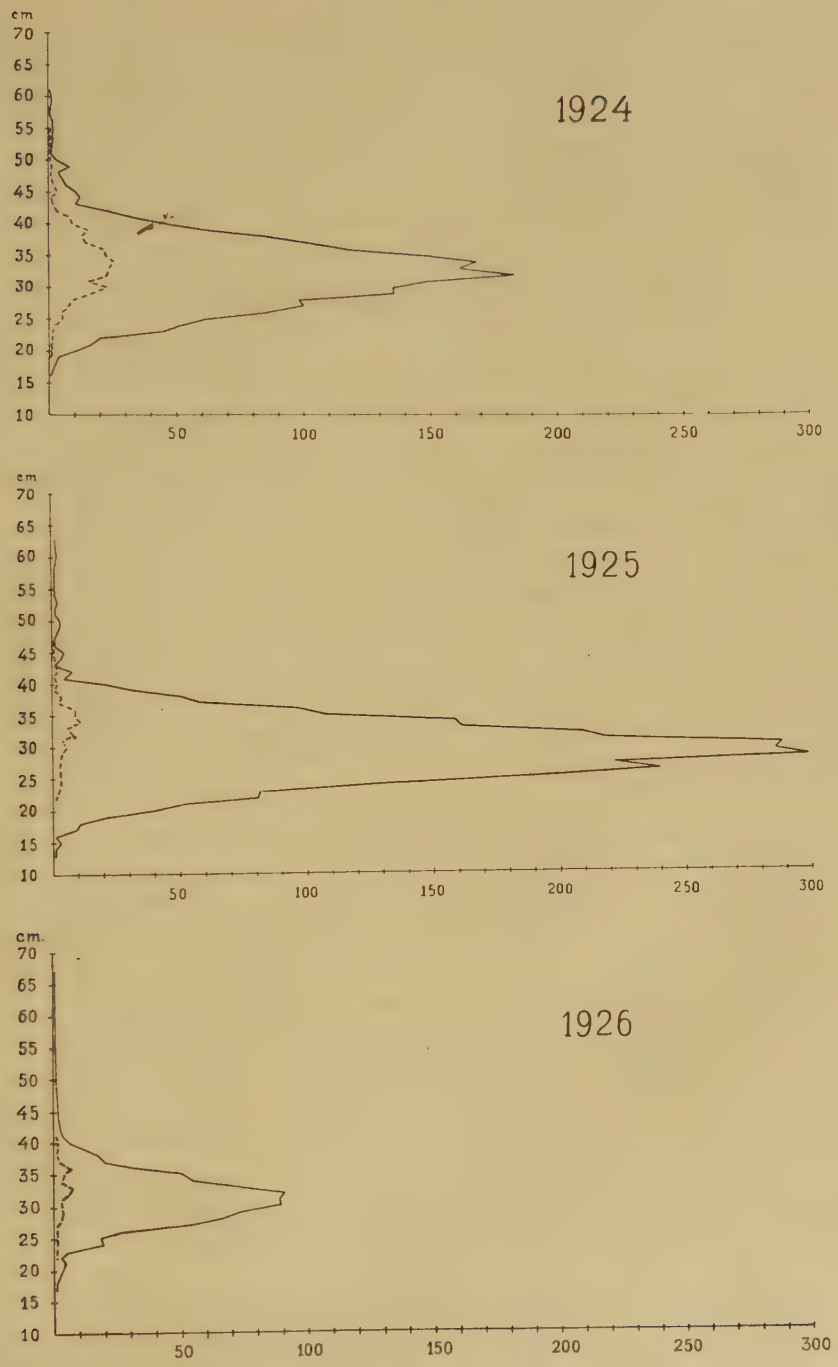
Unfortunately, it has not yet been possible to arrive at a comparison of the quantity of fish for intra- and extra-territorial waters at other seasons.

Marking Experiments in connection with the above-mentioned trawl work were made in Faxe Bay; abt. 530 marked plaice being liberated, partly in intra-territorial, partly in extra-territorial waters.

In the southern part of Faxe Bay, and also in Hvalfjord, preliminary Valuation Experiments were made (end June and early July) with Dr. Petersen's bottom sampler (0.2 m^2.), with a view more particularly to the study of the bottom fauna communities on the grounds where trawling took place. The valuations showed that among the important molluscs, *Macoma calcarea* was characteristic of the area where the intra-territorial trawling was carried on, this species sometimes amounting to abt. 200 per sq.m., while *Mactra elliptica* was characteristic of the extra-territorial trawling grounds, where it might at times amount to abt. 1100 per sq.m. Besides these molluscs, and *Abra*, *Cyprina* etc., the annelids and ammodytes are of great importance as food for the plaice, haddock etc.

Trawling was also carried out in Skjálfandi Bay; the quantity of plaice here at the end of July was considerably below the figures for the previous years; at depths between 7 and 10 metres, for instance, about the 1st of August, the following quantities of plaice over 25 cm. could be taken per half-hour haul with the 50-feet otter trawl:

in 1924: abt. 625 specimens
- 1925: — 250 —
- 1926: — 60 —



Number of Plaice (*Pleuronectes platessa*) per 20 hour's trawling, Faxe Bay, West Coast of Iceland.
June 1924, abt. August 1. 1925 and June 1926.
—— Intraterritorial. - - - - - Extraterritorial.

Experimental trawling was carried out in the Faroe waters, intra- and extra-territorially, and experiments were also made round the islands with lines; these experiments are, however, still at a purely preliminary stage, and will also have to be extended so as to embrace other seasons of the year.

In connection with the trawling, preliminary valuation experiments with the bottom sampler were also made here under the superintendence of Dr. R. Spärck, both round the islands and up in the fjords and sounds. Up in the fjords, *Macoma calcarea* was very predominant (up to abt. 300 per sq.m.), just as in the Bornholm Deep in the Baltic; on the clay bottom farther out in the fjords, the fauna much resembled that of the eastern Kattegat (with *Abra nitida*, *Axinus flexuosus* etc.). Round the islands, close in to land, the valuations showed an epifauna of *Ascidia*, *Hydroida*, *Alcyonium* etc.; outside this, at depths of abt. 100 m., a rich *Modiola*-epifauna, and beyond this again an extremely poor bottom fauna correspondingly mainly to the deep *Venus*-communities of the North Sea and Kattegat (*Ophiura Sarsi*, *Abra prismatica*, *Mactra elliptica* etc.).

Marking Experiments with Cod to be made at the Faroes in intra- and extra-territorial waters north of the islands as soon as the cod appear here in sufficient numbers.

The Marking Experiments with Cod in Greenland waters, commenced in 1924 and 1925, are being carried on in 1926; it is expected that marking will be done here both on the east and west coasts.

The Inspection vessel "Islands Falk" is making collections of valuation samples with the Petersen grab, *inter alia* on the Fylla's Bank, west of Greenland.

According to plan, investigations were made in the North Coast waters as to the stomach contents of the Herring in relation to quantity and composition of the plankton. These investigations were made by the "Dana" only during the earliest days of the herring season, but will be continued throughout the season from a number of fishing vessels.

Investigations of the stomach-contents of herring showed that *Calanus finmarchicus*, crab larvæ, *Limacina* and *Euphausidæ* were the most important organisms in the food of the herring. *Calanus* was numerous throughout, both as an item in the stomach-contents and in the plankton samples; there was altogether a nice agreement between the composition of the herring food and the composition of the plankton; crab larvæ, for instance, were extremely numerous in both during the first part of the period, but showed a marked decrease towards the close of the investigations, when *Limacina* and *Euphausidæ* were found to increase in quantity both in the stomach-contents and in the plankton.

At places where the herring were found in shoals at the surface, the plankton was often found to be particularly abundant, the investigations also seem to suggest that *Calanus*, for instance, collects in patches at the surface, and that it is these hosts of copepods which the herring pursue.

COMBINED NORTH SEA
1925—1926.

By

David T. Jones.

In accordance with a Resolution of the International Council at Copenhagen in September, 1925, a special Committee was set up to deal with investigations carried on in the North Sea, which area was divided for purposes of administration into two parts by a line drawn from Berwick to the 200-metre line in the Skagerack in the direction of the Naze.

Mr. David T. Jones was elected Honorary President of the Committee for the whole area and separate Committees were appointed for the two divisions of the area as follows:—

Northern North Sea Committee.

Scotland:	Dr. A. Bowman, Chairman,
Denmark:	Dr. Johs. Schmidt,
England:	Mr. J. O. Borley,
France:	M. le Gall,
Holland:	Dr. J. J. Tesch,
	Prof. E. van Everdingen,
Norway:	Mr. Oscar Sund,
Sweden:	Prof. O. Pettersson,
	Dr. A. R. Molander.

Southern North Sea Committee.

England:	Mr. J. O. Borley, Chairman,
Belgium:	Prof. G. Gilson,
Denmark:	Dr. A. C. Johansen,
France:	Dr. Ed. le Danois,
Holland:	Dr. H. C. Redeke,
	Prof. E. van Everdingen,

Norway: Mr. Paul Bjerkan,
Scotland: Dr. A. Bowman,
Sweden: Dr. K. A. Andersson.

For the purpose of facilitating the work the following limits were fixed as the boundaries of the North Sea:—

North. — The 200-metre line from the Wyville-Thomson Ridge to the Skagerack.
West. — The 200-metre line from the eastern edge of the Wyville-Thomson Ridge to West of the Butt of Lewis.
South. — Longitude 2° W. in the English Channel.
East. — 8° E. longitude in the entrance to the Skagerack.

It was agreed that for the sake of continuity the programmes of the previously existing Herring, Cod and Haddock Committees should be reaffirmed for the year 1925—1926.

In accordance with Resolution 7 of the meeting of the Combined Committee held on the 2nd of September, 1925, progress reports have been prepared by the Chairman of the Northern and Southern Committees and have been circulated to members. Copies of the reports are subjoined.

The Report of the Northern North Sea Committee deals only with Scottish researches, no report of investigations in that area having been received from any other country. It has been considered desirable to present the Scottish report in some detail so as to indicate clearly the lines on which the investigations in the Northern area are proceeding and the most useful openings for participation by other countries.

NORTHERN NORTH SEA

By A. Bowman.

General.

During the year under review continuity of the work was maintained, precedence being given to researches on the herring and haddock and to the general physical conditions in the northern North Sea. The full programmes for herring and haddock are given in Procès-Verbaux Vol. XXVII, pp. 28 and 32. Eight of the items on the herring programme (1, 2, 3, 4, 5, 7, 8 and 11) and ten of the haddock programme (2, 6, 7, 8, 9, 10, 11, 12, 13 and 14) received special attention.

The Research Vessels.

Investigations at sea were carried out by the Research Vessel "Explorer" and by the Motor Boat "Enid".

During the year 1925 the "Explorer" was kept in continuous commission from mid-February until mid-December. The vessel was then laid up for overhaul and resumed operations in mid-February 1926.

The following cruises were completed:—

1925.

1) March: Trawling experiments; age assessment of the haddocks on the spawning grounds; hydrography of the north-western area.
2) March—April: Intensive survey of the Firth of Forth and adjacent areas to determine the distribution of the autumn and spring herring broods.
3) April: Hydrographical conditions of the middle North Sea; trawling experiments; the distribution of the age classes of haddock.
4) April—May: Investigations on the distribution of the young year classes of herrings in the Firth of Forth, by means of boom net, small meshed nets, and seine nets.
5) May: Trawling survey of the nearer eastern grounds, with special reference to the distribution of the haddock year classes. The spring herring broods of the West coast of Scotland.
6) July—August: A survey of the summer herring fishing grounds — the prevailing hydrographical and planktonic conditions — sampling of the herring shoals by means of drift nets of varying size of mesh.
7) September: Survey of the north-western grounds north of Aberdeen to determine the loci of spawning of the newly hatched herring; hydrographical and planktonic conditions within the area; the distribution of the various age groups of haddock.
8) October: Trawling survey of the Moray Firth area. The herrings of the Inverness Firth.
9) December: The distribution of the autumn broods of herring in the Firth of Forth and adjacent areas.

1926.

10) February: Experiments with otter trawls and different sizes of cod-end meshes.
11) February—March: The distribution of the larval and post-larval stages of the autumn and spring broods on the East Coast of Scotland.
12) April—May: Experiments with otter trawls and different sizes of cod-end meshes. The distribution of the haddock population in the northern North Sea at the close of the spawning period.

During the month of April 1925 the Motor Boat "Enid" co-operated in the herring investigations in the Firth of Forth, investigating the distribution of the large unscaled and small scaled stages in the upper reaches of the Firth. From May to October a survey of the lobster fisheries of the West Coast of Scotland was carried out and during the month of November she was engaged in small-line fishing from Aberdeen, when 600 haddocks were marked and liberated. During the months of March and April 1926 crab and lobster fishing experiments were undertaken by the "Enid" in the vicinity of Aberdeen.

Owing to the industrial position the programme of work of the "Explorer" has been seriously interrupted. In all probability, however, it will be possible to complete a survey of the summer herring fishing grounds at the spawning period.

During the month of June 1926 experiments with a fine meshed seine net were made in the vicinity of Aberdeen from the motor boat of the "Explorer". A large number of unscaled clupeoids were caught.

While the main objects of the various cruises are given in the above brief summary, routine trawling, hydrographic and plankton observations also were carried out on all cruises and the general survey of the bottom fauna continued by means of the Petersen Bottom Sampler and Agassiz Trawl.

Haddock.

Under the scheme of co-operation with the Ministry of Agriculture and Fisheries the extensive ichthyometrical and statistical data relative to the haddock for the whole of the North Sea are delegated to Scotland for treatment.

Although intensive investigations on the herring and haddock have been carried out according to plan since their inception in 1921, it is difficult to state whether any one year can be described as a normal or average one in view of the considerable variations occurring from year to year.

The occurrence of these marked variations within the period under review has, however, presented exceptionally favourable opportunities for the study of the haddock, which, assuming demersal habits at a very early age, is readily captured at all stages thereafter by the use of appropriate apparatus. A continuous survey of the area has therefore made it possible to note the numerical strength of each year's brood almost as soon as it is added to the stock, to define more or less accurately the abundance and distribution of the different year classes, to determine their rate of growth within the separate regions, to follow their gradual dispersal with increasing age and finally to trace their segregation as mature fish in the spawning shoals.

The basis on which work has proceeded so far has been that of accurate age determination. Much preliminary investigation was made with a view to testing out the scale theory and its general application to this species. All available sources of material were tapped and it was sought to study the growth of the haddock and its scales month by month over as wide an area as possible. Confirmation of the method has been obtained experimentally by keeping fish of different ages in tanks and studying their scales at intervals. During the last three years haddock have been kept in the aquarium in order to study the effect of simple experimental conditions upon their rate of growth and light has been thrown on the difficulties sometimes met with in reading the scales of haddock from the sea. It is possible to cause the formation of a "false" winter ring on the scale in mid-summer by suddenly changing the conditions of life, and to double its rate of growth by providing a sufficient food supply.

At the same time experiments were made in the aquarium to devise a pract-

ical method for marking haddocks in numbers at sea. After several trials a small oblong silver identity disc and a vulcanite plate held in position on the operculum by silver wire appeared to give most satisfactory results.

The first set of marking experiments was carried out on haddocks caught by otter trawl and seine net. Although all fish marked were caught in hauls of short duration in shallow water and liberated in an apparently lively condition no recaptures have been notified.

Trials were therefore made in 1924 with line caught haddock, but recaptures were too few from those experiments for any conclusions to be drawn. A second experiment with line caught haddock was undertaken in November 1925 in the vicinity of Aberdeen. Six hundred of the liveliest, lightly hooked and apparently undamaged fish were marked and liberated and in two and a half months forty of these were recaptured. Unfortunately the value of this experiment was somewhat depreciated in view of the fact that most of these were recaptured within a very short period of liberation by trawlers working in the vicinity. Few of the marked haddock had moved far, the limits of migration being fourteen miles to sea and as far as Stonehaven and Whitehills (Banffshire) along the coast. The most interesting recapture was a fish taken by small line off Helmsdale in the Moray Firth in April 1926 after five months' freedom.

The difficulty of making an extensive experiment has again been emphasised, but as a result of the experience gained it has been decided that only line-caught haddock lightly hooked through the lip are suitable for this purpose.

The later experiments have also demonstrated that the type of mark used tends to work loose in the thin operculum and ultimately falls out. A mark has yet to be found which a small or medium haddock will carry for a period of more than three to six months.

As a result of these preliminary investigations, the ground has now been cleared in so far that experience of differing types of scales in the same and separate areas has been gained so that given adequate scale samples of a catch of fish, together with the statistics of numbers and sizes caught by standard gear in a stated time, the proportional distribution of the various year classes of haddock can be worked out for each map square.

All available sources of information and material have been tapped for this study. A wealth of material for detailed analysis of the prevailing conditions is obtained from the commercial statistics of the total weights of the market categories large, medium and small, and from fish measurers' records of the size composition of the catches made by commercial vessels. Numerous measurements and scale age determinations are made from catches landed at Aberdeen Market. The conditions at Aberdeen are specially favourable for such studies and the collection of data and material from commercial sources is greatly facilitated by the active co-operation of fishermen and others connected with the industry. Close

touch with the fisheries is maintained by means of weekly reports furnished by the District Officers of the Fishery Board for Scotland.

Finally, special cruises of the Research Vessel are devised to obtain as complete a survey as possible of the conditions over a wide area. In particular, each year attention is directed specially towards ascertaining at as early a date as possible the numerical strength and distribution of the new brood added to the stock. These new arrivals captured in the small mesh covering on the cod-end of the ordinary commercial trawl are readily distinguishable for many months by their size from the broods of previous years, but with increasing age this method of age determination becomes of less practical value and scale age determination is necessary. In other words, one of the chief functions of the Research Vessel is to verify and amplify the data procured from commercial sources. Every endeavour is made to work up the scale samples as soon as possible after collection in order that a close watch may be kept on changes in the age composition of the stock in the various regions and in order that the work may be modified accordingly.

For the period prior to 1904 no material for detailed analysis is available except total weights of haddock marketed and the fishing power which produced them.

During the period 1904—1920 (incl.) the only statistically valuable material for the present purpose in addition to the weights as above, is the continuous records of catches made by the Scottish Research Vessel using a standard otter trawl. Scale samples were, however, taken only at irregular intervals and the process of working up the Scottish research figures for these years has been largely one of enforced use of the analogy of post-war results. As a small mesh covering was not invariably used, extensive information is lacking as to the precise sizes and numbers of each year brood during its first year or two. Moreover the experiments were grouped around the coast owing to the study of flatfish then proceeding and very few results from the central North Sea are to be had. With the additional intervention of the war period, the study of this series of years must of necessity be a very incomplete one, yet it is desirable to glean as much information as possible from it so that nothing which was done should be lost.

Since 1921 the material available has been on the whole sufficient to enable a first set of conclusions to be drawn. The most useful statistics naturally emanate from the country chiefly concerned — Scotland, whose Research Vessel has been fairly continuously at work sampling the haddock population in as wide and representative an area as possible. About 15,000 haddock have been accurately aged per year by scale examination and in addition dependable data bearing upon the numbers of the O-group (and often I-group) fish were obtained by use of the Petersen method of obvious modal figures. However the area covered by this accurate work was mainly confined to the sector Shetland-Naze-Tyne. Occasional work was done on the north-west side and in the more northerly parts of the

North Sea and will probably be improved upon in years to come. Information regarding the composition of the commercial catches with respect to size and age has, however, been obtained from a somewhat wider area from analysis of selected catches in the Aberdeen Market.

As the work of the year is not yet ready for publication, only a rough indication can be given at the moment of the progress of events. It may be remembered that there have occurred since 1920 two very productive spawning years — 1920 and 1923. The latter may yet prove to have been the best since the beginning of the present century. There have also occurred two very poor years — 1921 and 1922, causing a scarcity of small and medium haddock in 1922, 1923 and part of 1924.

The great preponderance of the 1920 brood in the commercial catches of 1921 and 1922 had already indicated that there would be a plentiful supply of these three-year-old haddock in 1923. As events proved, the 1920 brood occurred in all North Sea catches in varying proportions of from 40 to 80 per cent. of the total, and formed the mainstay of the haddock supplies as small or medium fish according to the area from which they came. The preponderance of the 1920 brood was the more marked in view of the almost complete failure of the broods of the two succeeding years. While the records of the last twenty years show that very good or very bad years for the survival of haddock larvae occur at greater or less intervals, only once have two good or bad years occurred consecutively.

One might expect that to produce such a successful brood as that of 1923 there must have been more spawning fish than usual on the grounds. Such was not the case, however, as a great falling off in the number of older fish in 1922 and more so in 1923 is noticeable. On the other hand, the numbers of smaller spawners were nearly maintained in 1923, and it is from these that the successful brood sprang. An analysis of the statistics for the various years shows that in 1923 the number of spawning haddock was certainly not greater than usual — was indeed probably smaller, and that nevertheless the surviving issue was greater in number than has been the case for many years. It is therefore highly probable that in accounting for a bad or good year of young haddock survival, the investigator should concentrate on a study of the conditions during the very early stages in the life of the species.

Now there have been added to these extremes two moderately good years — 1924 and 1925 — in which the northern North Sea and the deeper channels were restocked with young fish, but the main shallower part was not, as it was in the good years 1920 and 1923. It may prove once there are sufficient data available concerning a series of years that such years as these last two are normal years, and that the others are departures from the normal.

During the April—May cruise of the present year on the itinerary along the edge of the Continental Shelf an interesting contribution to the knowledge

of the extreme bathymetric range of the haddock was made. At a depth of 265 metres on the edge of the Norwegian Channel near the Viking Bank 50 haddock were caught in a one hour's haul. These belonged to the two most recent year broods with the exception of one nine-year-old fish and the 1923 brood was unrepresented. Sufficient trawl warp was not available for trials in deeper water, but the question of the degree of continuity between North Sea and Norwegian haddock is one deserving further enquiry.

A special report will be issued in the near future dealing with the distribution, movement and shrinkage in numbers of the several year classes, but a ready idea of the approximate position in 1925 can be derived from a study of the figures in the subjoined table. In it is set forth the percentage composition of the haddock shoals sampled by the Research Steamer in fairly representative North Sea grounds during the year.

Year Class	Total Captured	Percentage of Total
1925	11,552	14.2
1924	19,741	24.3
1923	47,538	58.5
1922	209	0.3
1921	332	0.4
1920	1,822	2.2
1919	177	0.1
1918	11	—
1917	2	—
1916	2	—

It will be seen that among the haddock of the years previous to 1923 the 1920 class retains its numerical ascendency. For the three years 1924, 1923 and 1922 it has provided 71, 73 and 73 per cent. respectively of all the haddocks caught belonging to these years. The upgrowth of the 1923 class has, however, completely displaced it from its position of importance. Thus the year 1925 has witnessed a revival of the North Sea haddock fisheries and removed the depression due to the palpable failure of the 1921 and 1922 broods. The present indications are that there will be a continuance of a plentiful supply of small and medium fish, for not only is the 1923 class still numerically strong but coming behind it, though as yet mainly confined to the deeps, are the 1924 and 1925 classes. Unlike the 1923 class which in its initial year was distributed all over the North Sea, these latter are unlikely to affect to any considerable extent the southern and eastern grounds from which the catches may now be expected gradually to diminish. Fish of over four years of age are at present of unimportance in the catches. Even the yield of the 1920 class has ceased to be considerable so that the North Sea fishing is at

present dependent for the most part on the exploitation of young fish, only the fastest growers among which (those in the shallower parts) reach the market size "large" in so short a time.

The haddock investigations have therefore now reached a highly interesting and important stage. Representatives of the originally abundant 1920 year class are already comparatively rare in the catches and the phenomenally successful 1923 brood is even now losing pride of position to the upgrowing and less prolific (but as yet comparatively untouched by fishing operations) younger year classes. There remains therefore the practical issue of the question, namely, to determine the speed at which each year class will be eliminated from the stock and to ascertain how rapidly they are being replaced in the commercial catches by the influx in each successive year of contingents from the younger year classes.

Finally, there remains the vital question of the relation of the intensity of fishing and the rate at which each successive year class is eliminated from the stock. Commercial fishing operations as carried on at present involve the destruction of enormous numbers of undersized and unmarketable haddock and the question naturally arises whether by the continuance of the methods on such a large scale the annual productivity of haddock from the area can be expected to remain indefinitely at an optimum both in weight and value. The answer is not a simple one, but involves amongst other questions — the amount of food available, the growth rates and distribution of the year classes of haddock in the different areas, the point in the life history of the species at which elimination of the year class by the fishing apparatus begins, the intensity of fishing in the different areas etc.

During the last few years observations have been made on the stomach contents of haddock caught in different areas and of its relation to the supply available on the grounds. Special attention has been devoted, however, to the question of the eliminating action of the different types of gear on the haddock population.

As far as the North Sea is concerned therefore there is being prepared a fairly accurate evaluation of the regional haddock population back to 1920 and a very approximate one for the period 1904 to 1920. Each year group has been followed throughout its history with the object of discovering the rate of diminution of its numbers.

The most important task for succeeding years will be to collect material which will describe with accuracy the age composition of the stock of haddock within the whole ambit of its distribution. It is not feasible, however, for the Scottish vessel to visit either the most northerly and easterly limits of the haddock distribution in the North Sea or the areas south and east of the Naze-Berwick line more than very occasionally. So far three regular sources of information for these areas have been utilised (1) Market measurements at Aberdeen, with scale samples, (2) the British commercial monthly statistics of lengths and numbers of fish caught per

ten hours' fishing, (3) the British statistics of the total weights of the categories large, medium and small. Up till recently the value of the two latter sources of information has been greatly enhanced in view of the fact that practically only two broods of fish existed in any number in these parts and one being two years older than the other the measurements were in themselves indicative of age. This state of affairs has now passed and is unlikely to repeat itself except at rare and extended intervals.

To obtain the maximum value in future from these two sources of information scale samples (at least occasionally) are essential.

One of the chief difficulties in regard to the haddock as in regard to most fishery research so far has been the miscellaneity of the sources and types of data supplied, making co-ordination very difficult. The equipment of research vessels with a standard trawl appears to be the first essential so that it might aid in regional sampling of the marketable species.

It is also of great importance that immediate investigations of unusual catches in little frequented parts should be made and in this connection the recent publication of a study of the invasion of the Baltic by the 1923 brood is invaluable, although in future it may perhaps suffer in that no international statistical standards have yet been set.

The fact that the natural fluctuations in the annual supply and areal distribution of the first bottom stages of the haddock depend in all probability on the conditions prevailing at the spawning period has not been overlooked. The examination and tabulation of the large collections of haddock eggs and larvae which have been made since 1904 are gradually being overtaken. Abundant material is available from the western border of the North Sea, but from the eastern border on the edge of the Continental Shelf northwards to Viking Bank — an important spawning region for the haddock — the collection of material is scanty and sporadic. Contemporary hydrographic observations and plankton collections are also available for the period.

Herring.

The investigations on the herrings in the northern North Sea stand in a somewhat different category from those of the haddock. In contradistinction to the haddock, the herring is a pelagic species from the very earliest stages and no methods have yet been devised whereby a continuous picture of its life history can be obtained. Our knowledge of the occurrence and distribution of the various shoals within the area is not continuous and there still remain many gaps in the life history of the species which have to be bridged.

The loci of spawning of the spring and autumn spawners round the coast of Scotland from Lewis in the West to Berwick on the East Coast have now been defined with considerable accuracy mainly from the records of occurrence of "spawny" haddock. Additional observations on "spawny" haddock made during

the past three years have confirmed these earlier conclusions. There is evidence for the years 1924 and 1926 that spring spawning may occur on the western edge of the Norwegian Deep in the neighbourhood of the Viking Bank.

More direct experiments have been made for the location of herring spawn by means of the Petersen Bottom Sampler, but this method of investigation has failed to give satisfactory results even although numerous trials were made with the apparatus at the appropriate time on known spawning grounds. The more recent records of eggs, in situ, have been recorded from the following grounds:—

March 10th, 1924. Lat. 60°46′ N. Long. 2°08′ W. 68 fms. 7.74° C.
Small stones, pebbles and grit.
March 22nd, 1924. Lat. 58°44′ N. Long. 5°00′ W. 48 fms. 6.27° C.
Coarse sand with shell fragments.
March 23rd, 1925. Lat. 55°59′30″ N. Long. 3°11′30″ W. 4 fms. 5.4° C.
Mud, with cinders and shell fragments.

Confirmation of the disposition of the spawning grounds has been obtained through the records of capture of the newly-hatched larvae.

From a comparison of the records of capture of herring larvae in different areas of the North Sea it is apparent that the productivity of the spawning grounds in waters adjacent to Scotland is high.

The researches on larval and post-larval herring during post-war years have proceeded along the lines determined by the examination of the material collected in pre-war years. While the pre-war material was collected as part of the ordinary routine the experiments were not devised specially to study the question of the dispersal of the larvae. Hence, although the material is voluminous and drawn from a very wide area, there are breaks in the continuity of collection of the material in each year which preclude a full discussion of the question. The report on these pre-war collections is now ready for the Press and will be published at an early date. In the post-war years, however, the concentration of the work on the herring investigations has permitted of the systematic collection of larval and post-larval clupeoid material throughout the year.

The size of the larva when newly hatched from the egg has been determined by a series of measurements of the yolk sac stages of the spring and autumn broods. The degree of absorption of the yolk sac varied slightly but only those which appeared to be newly hatched or had the yolk sac still large were used in measurement. The spring brood has a range in sizes from 6.5 to 10 mm. with the maximum number at 8 mm., while the range for the autumn brood is 5.5 to 9 mm., with a maximum at 7 mm.

From a survey of the material collected the following points may be summarised. Broadly speaking, there appears to be little difference in the loci of spawn-

ing from year to year. The larvae of the spring brood occur with a maximum in April and extend from the end of February to May. The areas of greatest density in the northern North Sea are in the Firth of Forth and the Norwegian coast between Latitudes 59° and 60° N. Larvae occurred with less frequency in the following areas:— East of Orkneys, North-West Moray Firth, Norwegian Coast between Latitudes 61° and 62° N. and in certain years in the area of Bressay Shoal eastwards to the west side of the Norwegian Deep.

There is an absence of records in pre-war years of spring brood from the Aberdeenshire Coast and from the North and North-West of Scotland (Minch). In the latter case this is due to lack of sampling, for the post-war material gives abundant proof of the predominance of spring spawning shoals. Spring spawning, however, on the Aberdeenshire Coast seems to occur only in certain years and then appears to be of little importance.

The production of the autumn brood in the northern North Sea reaches its maximum in September. It begins, in some years, at the end of July in the Shetland Area and extends to November, and may, in certain years, be prolonged into December along the East Coast of Scotland. The maximum frequency is progressively late from North to South. There is no evidence of a deep water spawning in the autumn months in the area between the Viking Bank and Bressay Shoal.

There is a great preponderance of the autumn brood, the proportion of autumn to spring larvae being almost four to one. In June and January there is an absence of herring larvae.

With a knowledge of the spawning places and of the prevailing currents, a considerable degree of accuracy is obtained in separating the post-larvae of the two broods by plotting the size frequencies according to their regional distribution. The racial method has not been applied except in the case of the larger post-larvae, where it is possible to count the number of vertebrae with the help of a suitable staining medium.

The larvae and early post-larvae are carried passively by the prevailing currents whose normal course is now better defined and a general approximation can be made as to the origin of the post-larvae in any area and as to their rate of growth.

The areas of greatest density are the Moray Firth and Firth of Forth. Conditions, however, may become complex owing to the presence in the same area of post-larvae originating from widely-separated areas, as may happen, for example, in the Firth of Forth. These post-larvae may have their origin in the immediate neighbourhood or from such northern spawning loci as East of Rattray Head or off the South Coast of the Moray Firth. The occurrence in the Firth of Forth in the spring months of comparatively small post-larvae of the autumn brood suggests that some may also originate in the south in the neighbourhood of the Longstone.

The origin of the post-larvae in the Moray Firth may be in the Firth itself

or in areas to the North-East of the Orkneys, Fair Isle and Shetlands, or in the North of Scotland.

The pre-war and post-war material show an absence from all areas of later post-larvae of the spring brood in the summer months. In fact there is only an odd record of these forms in the first half of June and none at all in July.

In spite of the frequency with which observations have been made in the immediate vicinity of the Shetland Islands at appropriate times, the paucity of records of occurrence of all sizes of post-larvae has an important bearing on the question of dispersal which must be brought out by future investigation.

In the spring of 1910, however, there was an interesting dispersal of early post-larvae apparently of Shetland origin into the region between Shetland and Norway where they became mixed with Norwegian spring brood.

There is also evidence in the material collected from the eastern side of the area that at least in certain years considerable spring spawning may occur on the grounds to the west of the Norwegian Deep.

In the pre-war material there is a lack of information regarding the dispersal of the spring broods on the North-West Coast of Scotland, although some information is available on this point in the records of the "Thor" for 1904—1908. In the post-war material there is strong evidence of the occurrence of the post-larvae in May to the West of Orkney but further investigation in this area is necessary to trace the dispersal and fate of the later post-larvae in the summer months before they have reached the scaled stage.

A certain proportion of the autumn brood reaches the scaled stage by the end of the same year but a large — if not the larger — proportion is carried over the winter months in the unscaled stage. The range in size of these post-larvae in May is from 28 to 49 mm., while the spring brood may reach a size of 20—25 mm. by that month.

In view of the fact that the larger unscaled sizes of both spring and autumn broods were practically unrepresented in the earlier material, attention has been directed to the capture of these larger and more active forms. The cheese-cloth and stramin nets being selective in their action and catching only the smaller sizes, special nets of wider mesh were employed for the capture of the more active and metamorphosing stages. The intensive search for these forms was carried out mainly in the Firth of Forth and adjacent areas while concurrently investigation was made into the composition of the stocks of the smallest scaled sizes occurring within the same region. A large number of fry was taken in the inner reaches of the Firth, and these fish, most of which showed the scale pockets well-developed, have filled in a gap in our knowledge of the life history of the herring within the area.

The post-larvae disappear almost entirely from the catches in the offshore grounds approximately at a size of 40 mm. though a few 40—45 mm. have been

recorded at considerable distances from land. The nets which made successful catches in shallow water were put in use but the later stages have been secured in insufficient numbers to add to our previous knowledge. The delimitation of the offshore distribution of these larger post-larval stages requires further investigation as the present records, based on catches with nets which are not specially adapted for the capture of the larger and more active forms, suggest that some at least of the metamorphosing stages may not be in estuarine waters or within the immediate coastal zone.

Our knowledge of the distribution of the small herrings between the sizes of 5 and 8 centimetres in Scottish waters is extremely meagre. As has already been stated, a very large proportion of the autumn brood of herring may be carried over the winter period while still in a very small and unscaled stage. Growth of the post-larvae during the winter months is practically arrested only to begin again with the advent of more favourable conditions in the spring months, when the new spring brood is hatching from the eggs. It is obvious that the quick-growers (or earlier hatchings) of the spring brood may overtake the slower growers (or late hatchings) of the previous autumn brood. This is a feature which appears in most of the areas where the frequency figures of the various size groups are collected monthly. In the smallest scaled sizes there is a tendency for the fish to segregate in shoals according to size even in the narrow estuarine waters. If sufficiently representative material is procured, however, the spring and autumn broods of less than one and a half years old may still be distinguished from each other by their modal sizes, even although there is considerable overlap of the two groups. These two groups cannot be distinguished by size alone in the older year classes.

While the relative proportions and the absolute abundance of the smallest scaled stages of these broods in the coastal zone of the east coast of Scotland appear to vary greatly from year to year, the uncertainty of locating the shoals and the practical difficulties of capturing sufficiently representative samples at present preclude comparison being made as to the numbers which recruit the coastal zone and estuarine waters of the East Coast and the survival rates of the broods of different years.

The problem is a very difficult one not only owing to the fact that the autumn and spring broods may be mixed in variable proportions but that there is a distinct selective action in the various types of gear which have been used for their capture. For example, from the Inverness Firth there is ample evidence that the shore-seine used has a definite upper limit for size of capture as is shown by the catches of anchored drift nets of various sizes of mesh in the same area at the same time. In addition, the records appear to show that, in cases where the selective action of the net must be left out of account, there may be a distinct segregation of the shoals by size even within such narrow waters as the Inverness Firth and the upper reaches of the Firth of Forth. Comparison of the size groups of one year with

those of a corresponding age of another year is further complicated by the fact that the growth rates of the broods may vary from year to year.

During post-war years a considerable number of experiments have been carried out in the shallow coastal zone and in estuarine waters with various types of gear with a view to determining the composition of the herring shoals occurring therein.

The data are most voluminous from the following localities:— Firth of Forth, Firth of Tay, Inverness Firth, and Olna Firth on the west side of Shetland, and the following provisional results may be mentioned:—

In the Firth of Forth during the winter months when the herring fishing is at its height there are, in addition to the unscaled representatives of the previous autumn brood, at least three size groups which are distinctly recognisable in the commercial catches and may be described by the trade terms as small, "halflin" and mature herring respectively. These terms, however, although convenient, do not describe the size groups very accurately as they may vary in character from year to year. In the fishing season 1923—24 the mature herring were 23 centimetres and over in length and had at least two well-marked rings on the scales. The "halflin" herring ranging in size between 17 and 22 centimetres were immature herrings which exhibited one clearly marked ring on the scales, while the small herrings caught by the ordinary commercial boom nets ranged from 10 to 16 centimetres in length and had no clearly marked ring on the scales. Experiments made with a small-meshed otter trawl showed that a still smaller size group of scaled herring, the individuals of which exhibited no rings on the scales, was also present in the Firth. Herrings with three rings or more on the scales were mature spring spawners, and therefore, unless one assumes that an autumn spawned fish may become a spring spawning fish, all these spring spawners belong to broods spawned in the spring months. The size groups of herrings occurring in the Firth of Forth in the fishing season 1923—24 may therefore be classified provisionally as follows, with respect to date of birth:—

No. of rings on Scale (not counting edge)	Year Brood	
	Autum	Spring
Eggs and Larvae	—	1924
Post-Larvae (unscaled)	1923	—
0	1922	1923
1	1921	1922
2	1920	1921
3, 4, 5 etc.	—	1920, 1919, 1918 etc.

These observations appear to show that the "small" and "halflin" herring in the Firth of Forth in the winter months may be either spring or autumn broods or a mixture of both in varying proportions according to the year.

A similar relationship has been found to exist between the youngest year classes in the material examined from other estuarine areas.

During the winter 1921—22 investigations were carried out by the Motor Boat "Enid" in the Inverness Firth, observations within the Firth being extended and correlated with experiments carried out by the Research Vessel "Explorer" in the Moray Firth. Here again three distinct size groups of scaled herrings were obtained. The smallest group was composed of fish with sizes ranging from mainly between 8 and 10 cm., the intermediate group ranging between 11 and 15 cm. and the largest group (the Kessock Herring) ranging from 16 cm. upwards.

An analysis of the scales shows that the two smallest groups represented in the seine net catches were composed of herrings which have no well-marked ring on their scales, while the largest group is composed of herrings on which at least one marked ring is present. Experiments with a stramin net showed that post-larval or unscaled clupeoids (verified to be herring by counting the vertebrae) were also present with sizes ranging up to 45 mm. In other words, in the Inverness Firth in season 1921—22 there were present progeny of the autumn spawners of 1921 (the unscaled herring) progeny of the 1921 spring spawners (the group ranging between 8 and 10 cm.), representatives of the brood of the autumn spawners of 1920 (the group ranging between 11 and 15 cm.) and a group which is in all probability composite and consisted of survivors of the broods spawned in spring 1920 and autumn 1919. In addition a few large full-grown herring were found mixed with the shoals of "Kessock" herring. These were full of milt and roe and were undoubtedly winter or spring spawners. In the Inverness Firth, however, no spawning takes place and representatives of the spring and autumn broods are carried into the estuary from more distant grounds.

In comparing the sizes of the different year classes found in the Inverness Firth with those from the Firth of Forth it must not be forgotten that spawning in the autumn is slightly earlier in northern grounds and further that due regard must be given to differences of environment, and that, finally, comparisons must be made between comparable broods of the same birth year.

In September 1920, July 1923 and August 1924 and 1925 observations were made as to the composition of the shoals of herring occurring in Olna Firth on the west side of Shetland. The herrings were caught mainly by anchored nets, the meshes of which were of various sizes, ranging from sprat-net to mackerel-net size.

The herrings caught in August 1925 consisted of three very distinct groups with modes at 12, 19 and 22 cm., while the herring secured in September 1920 had the same number of groups with modes at 12, 19 and 24 cm. respectively. Seine net operations in the Voe in July 1923 and August 1924 revealed the presence of a still smaller group ranging in size from 6 to 10 cm. The scales of the herring of the two groups of smallest size showed no rings on the scales, while the herrings

of the group with modal size 19 cm. had one clearly marked ring. Herrings belonging to the group of largest size had two or more clearly defined rings. There is a very significant difference between the two-ringed group caught in 1920 and that caught in 1924. In September 1920 the two-ringers had a modal size of 24 cm. and the calculated sizes at the end of the first year of scale growth lay between 10 and 11 cm. whereas those caught in August 1925 had a mode of 22 cm. and a calculated size at the end of the first year of scale growth of 7 to 8 cm.

These observations therefore suggest that the relationships of the younger broods found in the Voe on the west side of Shetland are somewhat similar to those found in the broods of the Firth of Forth and Inverness Firth.

The modal size of the group with one well-marked ring on the scales is greater than that obtained for the corresponding group either in the Firth of Forth or Inverness Firth and it is difficult to determine from the material at present available whether this difference is due to a preponderance of autumn spawned herring in the group or whether the more vigorous growth is a racial difference characteristic of the area. This is a question which can be decided only by further investigation.

While it has been possible to trace with some degree of confidence the relation of these small scaled sizes to their respective spawning shoals, it is difficult to follow how they in turn recruit the spawning shoals in later years. Energetic efforts have been made to map out the distribution of these young year classes through the records of capture in fine meshed nets and by their occurrence in the stomachs of the predaceous fish. The almost complete absence of records from the offshore deeper grounds of the North Sea and the paucity of records from the shallower grounds except from the estuaries and the near neighbourhood of the coast suggest that the autumn herring fishery of the middle North Sea grounds may not be recruited entirely by the upgrowth of the younger year classes which are found in the neighbourhood of the Scottish East Coast. It is probable that recruitment takes place from the shoals of smaller and younger herring which occur further to the south.

In view of the fact that the scale age determinations of the older year classes of Scottish herring present many difficulties, detailed analysis of those older groups has been postponed until their relationships with the younger year classes have been more clearly defined.

Although copious scale material from the older age classes has been collected and examined as part of the routine work, attention has been directed mainly to the distribution of the shoals and to their composition with regard to size, sex, degree of maturity, condition etc. In addition to the numerous samples examined from the fishing grounds during the normal fishing season, every opportunity has been taken to procure material from as many localities as possible at other periods of the year.

The purpose of these investigations has been to arrive at an estimate of the average conditions prevailing within the area, and the attainment of such a result has been proved to be possible only by the examination of numerous samples of herring secured from the chief fishing grounds and by co-operation with the trade. The fishing grounds are divided into regions coinciding more or less closely with the areas fished by the commercial vessels from the chief fishing ports and by arrangement with the District Officers of the Fishery Board for Scotland representative quarter-cran samples of unsorted herrings are sent according to time table for detailed examination at the Laboratory at Aberdeen.

In addition to the above, many samples of herring caught during the winter and spring fishery on the north and west coasts of Scotland and around Shetland have been examined for the purpose first of establishing the essential differences between spring spawners and autumn spawners, and secondly of tracing changes in the composition of the shoals.

Attention has also been devoted to herring landed by trawlers which engage in herring trawling on the Fladen and adjacent grounds, and also to herrings which are caught by liners fishing for bait on grounds beyond the normal range of operations of the herring drifters. Special investigation has also been made by the Scottish Research Vessel fishing with nets of different sizes of mesh. The results of these experiments show a selective action of the nets according to the size of the mesh, herrings of much smaller size being caught than those caught by the commercial drift nets in the same area. The results indicate the importance of further experiments of a similar nature as an aid to the understanding of the actual stock of herrings on the fishing grounds.

From the copious data collected it is very clear that herrings which spawn in autumn in the northern North Sea are rarely represented in the shoals which come to the coast to spawn in February, March and April. The shoals are more or less homogeneous in respect of maturity. On the other hand herrings which spawn in spring supply a very large quota to the landings made during the early summer all round the Scottish coast. The general complexion of the summer herring shoals is influenced largely by the degree of admixture of spring spawning herring.

In post-war years each summer herring fishing season has been characterised by distinctive features with respect to the composition of the shoals. In the summer of 1922 the herring fishing was one of the poorest experienced on the Scottish East Coast and the quality of the fish presented certain unusual features. Large adult herring were remarkably scarce and small mattie herring constituted the bulk of the landings. Spawning was prolonged until late in September, the extension of the spawning period being due largely to the fact that the dominant group of small herring did not mature until late in the season.

The summer herring fishing season in 1923 was a productive one although large herrings were even more scarce in the catches than in the previous year.

The herrings caught were, however, particularly rich in fat and showed every indication of being well nourished. They were of better quality in every respect and larger on the average than those of the previous year.

The year 1924 was remarkable for the abnormally late period at which spring spawning took place. Normally, spawning is completed by the end of March or early in April, but in that year spents were not recorded in appreciable numbers before March, while in the third week in May a shoal was located on the north of Scotland of which over 40 per cent. of the fish were still ripe. Indications of an extended spawning period were also observed in the Shetland area, although in May no sample contained such a high percentage of ripe fish as the one from the north of Scotland.

During the summer of 1925 the fishery on the East Coast of Scotland was remarkably poor with the exception of a limited area fished by the Wick and Stronsay fleets. The herrings were much leaner than usual and as a consequence were slow in developing. Spawners were poorly represented on the grounds in August, and fishing operations were gradually coming to a close for the season when considerable shoals of ripe spawning herring were located in the neighbourhood of Clyth Nees and along the north Aberdeenshire and Banffshire coasts.

The intensive but short survey of the rapidly varying conditions occurring within the Scottish area has shown conclusively that a more thorough understanding of the life history of the species and of the limits of distribution of the shoals must precede attempts at detailed explanation of the causes of the fluctuations.

Plaice, Lemon Sole etc.

Although the more intensive investigations on the plaice came to an end when definite recommendations were made by the Council as to the policy which should be followed for the preservation of this fishery, attention is still being directed to the fish caught during the routine trawling experiments. In particular, a large number of marking experiments on small plaice have been carried out on the East of Scotland with a view to ascertaining their rate of dispersal from the narrow coastal zone and the rate at which they are captured by commercial fishing gear.

In addition, marking experiments on the large sizes of plaice have been carried out in Shetland waters and in the area to the north of Scotland with a view to determining the routes of migration. Recaptures are not as yet sufficiently numerous to be dealt with in detail, but it is obvious from the information already to hand that the movements of the mature plaice in these areas at the spawning period are not invariably in a direction contrary to that of the prevailing current.

During the period 1919—24 inclusive, 3,232 Lemon Soles were marked and liberated in Scottish waters and of these 321 were recaptured up to December 31st, 1925. The percentage of marked fish recaptured is very low even if allowance be

made for the non-return to the Laboratory of recaptured specimens. The fish marked range in size from less than 20 cm. to over 40 cm., the numbers being almost uniformly distributed over the whole range. There is an increase in the percentage of fish re-caught with increasing size from approximately 2 per cent for fish under 20 cm. to $14^1/_2$ per cent. for fish over 35 cm. The results are very consistent in this respect for each of the five years considered separately and it may therefore be assumed that, although all marked lemon soles were liberated apparently in lively condition there has been mortality due to marking and that the mortality is greater the smaller the fish marked.

Thirty-one per cent. of the recaptured fish were returned within one hundred days of the date of liberation, but over 23 per cent. enjoyed more than a year of freedom, while six specimens escaped recapture for more than a thousand days.

A small sample of scales was taken from each fish at liberation and these were compared with the scales taken from the fish on recapture. In each case, one growth zone and one only had been added for each year of freedom, thus establishing unequivocally the validity of the scale theory for this species in waters adjacent to Scotland.

The Lemon Sole on the Scottish East Coast may be regarded almost as a stationary fish, for less than 25 per cent. of those recaptured had migrated any considerable distance. Indeed a number of the fish which had been free for over a year were re-taken at the place where they were set free. The directions taken by those fish which have moved any considerable distance from the place of liberation are consistent and show that lemon soles on the East Coast of Scotland move northwards and westwards in a direction contrary to that of the prevailing currents.

Rays and Skates.

Rays and Skates are of considerable economic value. In Scottish waters, a few species figure largely in the captures of commercial steam liners, but very little is known of their life history, and especially of their age, rate of growth and migrations. Marking experiments have been initiated with a view to overcoming some of these difficulties but the returns have been very meagre.

The species are badly defined and the nomenclature is extremely confusing. In a memoir recently published, an attempt is made to bring some precision into the identification of the species, and into the nomenclature, before the more important biological problems of distribution and analysis of the stock are tackled.

Of the twenty-two species recorded as occurring in European Seas, nine are taken in Scottish waters. The commonest and most important of these are the Grey Skate (*Raja batis*) and the Thornback or Roker (*R. clavata*). Four others are of considerable commercial value — Shagreen (*R. fullonica*), Blonde (*R. bra-*

chyura), Sandy Ray (*R. circularis*) and the long-nosed Skate or Borer (*R. oxyrhynchus*), while the remaining three species are too small to be remunerative. These are — Starry Ray (*R. radiata*), Cuckoo Ray (*R. naevus*) and the Spotted Ray or Homelyn (*R. Montagui*).

Hydrographic and Plankton Investigations.

On all cruises of the Scottish Research Vessel provision is made for the collection of hydrographical data as part of the regular routine. In pre-war years an extensive hydrographic survey of the north-western area of the North Sea was carried out at regular quarterly periods along lines of fixed stations. In addition, a more intensive survey of the more restricted area eastwards of the Moray Firth and Firth of Forth was carried out at monthly intervals for a number of years. The salinity determinations were made by the hydrographer on the staff and the results of the observations were reported on without delay. These surveys, carried out as they were at all periods of the year, have given a solid foundation to our knowledge of the hydrography of the area. Drift bottle experiments, initiated by Scotland, were continued during the years 1910—14.

While hydrographic surveys similar to those of pre-war years have been carried out in the post-war period, most of the hydrographic observations have been taken in conjunction with the biological work; care being taken whenever possible to survey the area along "fixed" lines of stations so that continuity might be preserved.

The salinity determinations are made by the Government Chemist and the temperature and salinity records are submitted for publication in the Bulletin Hydrographique.

In accordance with the scheme proposed by the Council a large number of surface and bottom drift bottles were liberated at regular intervals of time from certain fixed stations during the period September 3rd, 1920, to November 9th, 1921. From the following five stations in close proximity to the Scottish coast, generally twenty bottles of each kind were liberated each week:— Bell Rock, off Buchanness, Smith Bank in the Moray Firth, Fair Isle, and Balta Island, Shetland. In addition, a limited number of experiments with drift bottles have been made during the period 1922—25.

Daily temperature observations were obtained in pre-war years from the North Carr Lightship, the Abertay Lightship, and from the Lighthouses at Rattray Head, Fair Isle, Out Skerries and North Ronaldshay. These daily observations were resumed after the war, and in addition, temperature observations have also been obtained from the Lighthouses Monach and Ailsa Craig on the West Coast of Scotland. Monthly temperature observations are also supplied by the Fishery Cruiser "Vigilant" from the Firth of Clyde area.

As no hydrographer has been available during the post-war years until within recent months, no detailed report of the observations has as yet been prepared. In view of the fact that the drift bottle experiments have probably the most immediate bearing on the biological work, the preparation of a report upon the results of these extensive experiments in the North Sea and north-western approaches thereto has been put in hand, and already some provisional results for the surface bottles may be mentioned.

As already stated these experiments cover two periods of five and six years respectively, 1910—14 and 1920—25, and involve the detailed study of approximately 3,830 recoveries from a total of 11,250 bottles liberated. Recoveries from the liberations in the year 1925 are still being notified. The percentage of recoveries — 34 per cent. — is small, but in consideration of the complexity of the surface currents in the northern and middle North Sea and the consequent long periods of drift of the majority of the bottles, the results obtained are, on the whole, satisfactory. The percentage of bottles recovered in the open sea is approximately 1.6 of the total number recovered. It is perhaps unfortunate that this percentage is so small since those recoveries afford valuable information as to the probable limits of drift in a particular direction and also as to the average speed of such drift, the factor of uncertainty regarding the actual time taken to arrive at the point of recovery being practically negligible in such cases. In the year 1925 a small experiment was tried with surface bottles to which hooks had been attached in the hope that some of these might be recovered in the drift nets.

Of the total recoveries effected, 22 per cent. were on the British coast and 76 per cent. on Norwegian, Swedish, Danish and German coasts. Few recoveries are recorded as having taken place on Belgian and Dutch coasts or on the German coast, west of the river Elbe.

Two methods of procedure have been adopted in the liberation operations of the drift bottles. In the first of these, a few bottles, generally five to ten, were liberated from a large number of more or less equi-distant stations in the course of the cruises of the Research Vessel. The second method, adopted in 1920—21, consisted in the liberation of a larger numbers of bottles at regular intervals of time from the five stations in close proximity to the Scottish coast.

While the latter method is probably of more value in the study of coastal drift, the former yields much more comprehensive results indispensable to a true conception of the results from the five stations already mentioned, especially in those cases — by far the more numerous — in which the drifters have crossed the North Sea.

In working up the results, charts were first of all prepared on which straight lines were drawn from liberation stations to stranding points. It was once apparent that beyond the demonstration of fluctuations in the main direction of flow of the current this method afforded little information of real value. A tabular method

was then adopted showing the frequency distribution of recoveries on the various sea coasts which were sub-divided into convenient sections. This method was adopted for the northern area in preference to the sector method of tabulation used by Carruthers in the southern North Sea as, it was felt, that a great deal of valuable detailed information might otherwise be overlooked. Subsequently recourse was had to a chart method similar to that employed by Ryder in 1901. Liberation stations and points of recovery were plotted on charts and the drift periods of each and every bottle studied with a view to tracing a course for each bottle recovered. The fullest information possible was extracted from this material before entering into a consideration of wind systems in operation and their probable effect upon the history of the bottles. This method, though laborious, has amply justified its adoption.

So far as the records have been investigated up to the present there remains no doubt but that the normal drift along the British East Coast is in a southerly direction from the Shetland and Orkney Islands and the north of Scotland to the Yorkshire coast where the surface current is gradually deflected in a south-easterly direction and finally about Latitude 54° N. in an easterly direction towards the Danish coast. It is evident from the results that under normal conditions, and in fact in all but very abnormal circumstances, the southerly limit of this south-coming current is about Latitude 54° N. over the area of the Outer Silver Pit which in all probability marks the southern boundary of the S. W. Dogger Bank swirl mentioned by Bohnecke, frequent reference to whose paper "Salzgehalt und Strömungen der Nordsee" has been made. The fact that the periods of drift of bottles recovered on Danish and Swedish coasts particularly, arrange themselves in groups, sometimes fairly well defined, affords strong support to his theory of swirls on the Dogger Bank and Lindesnaes areas. An attempt, so far successful, has been made, to determine the time period of these eddies, that is, the number of days occupied in making a complete circuit of the eddy, and it is here that the periodicity in drift periods of large numbers of bottles has been explained.

The general tendency of results for the North Sea as a whole justifies the conclusion that the average rate of flow of the surface water is considerably greater than has been recognised hitherto. Instances occur where bottles, thrown out near to the British coast, traverse the North Sea in such short periods of time that the assumption of a straight course, neglecting all eddy influence, demonstrates an average speed of at least five miles per day.

Strong evidence is contained in at least the earlier experimental records of the above periods, indicating the perennial existence of a Great Eddy between the Scottish and Norwegian coasts, moving in a counter-clockwise direction. The northernmost limit of this eddy is about Lat. 61°30′ N. and southernmost limit Lat. 57° N. and its existence explains in a marked degree the periodicity in times of drifting of bottles liberated from stations north of Lat. 57° N. and mainly to

the west of Long. 2° E. and recovered particularly on the Norwegian coast north of Stavanger.

The area to the immediate west of the Shetland and Orkney Islands and to the east of these as far as Long. 0° 30′ E. yields interesting and hitherto somewhat unsuspected results.

To the north of the Shetland group lies an area of great complexity. It appears to be very much a matter of chance whether a floating body, after entering this area, will proceed north-eastwards towards the Norwegian coast or turn southwards into the North Sea by way of the aforementioned Great Eddy or the western boundary thereof.

Eddies, which appear to be seasonal, in the Moray Firth and off the mid-east Scottish coast are demonstrated frequently from a survey of the records of recoveries on the adjacent shores of Scotland and northern England and the complete reversal of the normal coastal drift, observed from experiments in December—January 1896—97, gains further confirmation from these later records.

In pre-war years plankton surveys of the area were carried out concurrently with the hydrographic surveys and the results were duly recorded in Bulletin Planktonique.

In post-war years, however, the plankton investigations have been designed mainly as an integral part of the biological studies of the herring and haddock. On all cruises of the Scottish Research Vessel provision is made for the collection of plankton material and the scope of the work undertaken may be ascertained from the description of the cruises which have been completed. The main object of the surveys have been to follow the dispersal of the larvae of the two species from the spawning grounds and to ascertain the general planktonic conditions on the fishing grounds. In view of the fact that attention has been directed mainly to the herring and haddock larvae occurring in the collections, only general notes of the other material collected have so far been completed but with additions to the staff this work is now being overtaken. During the year the standard net recommended by the Plankton Committee has been employed but so far no fixed stations have been chosen at which periodic collections may be made.

Plankton observations in the summer and autumn of 1925 revealed a similar state of things to that which occurred in 1920. There was again an abnormal invasion of Salps into the North Sea through the Scotland-Shetland passage to the almost entire exclusion of other plankton organisms with the exception of Ctenophores (Beroe) and Medusae. During the month of August the Salps had invaded the North Sea area to the east of Orkney, and had penetrated as far south as Lerwick via the north of Shetland. During the month of September the Salps were found to have extended their invasion, indeed the plankton conditions approached very closely to those of 1920 though their distribution was not so sharply defined on their eastern boundary. They had invaded and flooded the whole area to the bound-

ary where the cold bottom strata were 8° C. and under. In this region they thinned out rapidly and disappeared from the catches. At the beginning of September Salps were taken off the Aberdeenshire coast and in the Moray Firth, but had disappeared from the Buchan Deep and from the south shore of the Moray Firth by the end of the month.

During the month of September post-larval hake were taken in relatively large numbers at most of the Moray Firth stations and in the Buchan Deep — as many as twenty in a single haul having been recorded. This is more than the total number of hake larvae previously captured during the whole period of researches in this area. The small size of many of the larvae, the occurrence of eggs in the catches, and the capture of a ripe and running female prove conclusively that the hake spawn within the north-western area of the North Sea in certain favourable years.

Holland. Masters of Herring vessels (3 from Vlaardingen, 3 from Scheveningen, 1 from Kalwijk) have been provided with plankton indicators (as described by A. C. Hardy in the publication of the Ministry of Agriculture and Fisheries, England, Series II, vol. VIII, No. 7, 1925) in order that they should examine the subsurface plankton each time before shooting their gear. They are instructed to note, as exactly as possible, whether the main bulk of the plankton catch is made up of Copepods, Diatoms, or some other organisms (to be judged by the general colour) and in some cases to preserve samples of these and to note analytically (matfulls, spents, etc.) the catch of the next shot together with data and locality.

From 3rd June to 3rd July a few hauls with the young fish trawl were taken between 58° N. and 60° N.

Sweden. Witch (*Pleuronectes cynoglossus* L.). In May and June 1926 a cruise was undertaken in the North Sea with the research steamer "Skagerak" in order to study the distribution and spawning-places of the witch. Many fishngi experiments were made in the northern North Sea up to ca. 59°30′. The witches caught were investigated as to the length and state of gonads and otoliths were collected. It was shown, that the witch spawns on places with a depth of about 80—90 m. and with a bottom of sandy clay.

In connection with trawling experiments hydrographical observations were made.

SOUTHERN NORTH SEA.

By J. O. Borley.

This Committee is charged with considering chiefly the problems of the part of the North Sea lying to the south of a line drawn from Berwick in the direction of the Naze until the 200 m. line is met in the Skagerak, and of that part of the

English Channel which lies to the East of 2° W. Long. The constitution of the Committee is laid down in the report of the first meeting.

At the same meeting it was decided to reaffirm for the year 1925—1926 the existing recommendations for research relative to Herring, Cod, Haddock and Plaice. The programmes of work of these fish were thus as detailed for Herring in 1921 (Rap. et Proc. Verbaux, Vol. XXVII, p. 28) for Cod and Haddock in 1921 (the same p. 32) and 1923 (the same Vol. XXXII, p. 26), and for Plaice (Vol. XXVII, p. 52). None of these programmes were prepared specifically for the Southern Committee, but the constituent countries of that Committee were already actively engaged in the researches recommended: the researches of the Council as recommended by the Committees most intimately concerned with Plankton and Hydrography are still less immediately a particular charge on the Southern Committee. The recommendations of the Plankton Committee in Sept. 1925 were not of a detailed character, but its Chairman, Prof. Ostenfeld, expressed the opinion that "the planktonic work of the International Council ought to be concentrated upon the study of such Plankton forms which constitute the food of fishes, fish larvae and fry" (Rap. et Proc. Verb. Vol. XXXVIII, p. 50). The recommendations of the Hydrographic Committee of Sept. 1925 (the same Vol. XXXVII, p. 48) confirm the Resolutions of the Conference held at Amsterdam in March 1925, which include the statement that "for the guidance of future work, and especially for the understanding of results obtained on fishery cruises, it is much to be desired that the results of past work should be summarised": the Committee then makes specific recommendations as to research (including continuation of Current Meter observations at certain Light Vessels, and as to publication of Hydrographic data). Thus during the year the work of the Committee as regards the chief food fishes conformed to definite programmes which however are of the most comprehensive and therefore the widest description, while in plankton and hydrography the liberty of action has been even greater. The details of the programmes to which reference has been made are well known, and their repetition here at length appears unnecessary.

It is for consideration whether it is desirable to render the programmes for the coming year in any way more precise, and whether the Committee's report on the year's work should not state the progress along the lines of agreed programmes as made by the Committee collectively, the part played by each of the participating countries naturally being indicated. Pending a decision of the Committee upon this point it has seemed advisable to retain the form of previous Administrative Reports, in which the work of each country appears together and separately from that of her associates. In alphabetical order and in so far as reports have been received they are as follows:—

Belgium.

FISHERY WORK. Weekly observations have been made of the stock in coastal waters by simultaneous fishing from a cutter and an open boat. The catch has been analysed as to species and size, the whole catch being measured, and progress has been made in the working up of the material so obtained.

Special statistics are collected of Sprats and Shrimps.

The data amassed during twenty three years of weekly observations made with commercial gear worked from commercial vessels is being treated in a memoir which is now approaching completion.

PLANKTON. Weekly observations of Plankton have been continued, and collections of material made by means of Plankton nets and Petersen's Young Fish Trawl in the course of the cruises of the "Zinnia", mentioned below.

HYDROGRAPHY. Daily observations have been taken on the Light Vessel West Hinder, as well as weekly water samples whose salinity was determined. The work suffered some interruption owing to the loss of gear in rough weather.

A registering thermograph has been installed on a ship plying between Ostend and Tilbury, and observations are made with this instrument twice weekly.

Two cruises have been made in the Fishery Cruiser "Zinnia" in the Southern part of the area, on the line Gris Nez — Shakespeare Cliff, Dover.

Denmark.

The following **fishery** researches have been made:—

Haddock. The contents of about 600 stomachs of Haddock from 93 different samples originating from the Jutland Bank and Little Fisher Bank Area (between 5° and 8° E. Long. and 56° and 57° N. Lat.) were investigated. The samples were obtained from Danish fishing vessels in the period from July to December 1925. The main contents proved to consist of Echinoderms and Worms. No spawn of Herrings were found in the stomachs.

A short report of the Danish Investigations concerning the food of the haddock in the North Sea in 1924 and 1925 is given by Erik M. Poulsen: Om Kullerens Føde i Nordsøen in "Dansk Fiskeritidende" for March 24th 1926.

Herring. Fishing experiments for young Herring and Sprat with ring-trawl and young fish trawl were carried out from the "Dana" in the eastern part of the North Sea (E. of 6° E. Long. and between 55°0 and 57°30 N.) in October 1925 and in the Graa Dyb waters in November 1925 and January and March 1926. The age and length of samples of the specimens caught was determined, and the contents of the stomach were investigated in many cases. The spawning of the Herring in the Jutland Bank Area was evidently of little importance in the autumn of 1925.

Plaice. Fishing experiments for Plaice with Otter-trawl were carried out from "Dana" in the Horns Reef Area in October of 1925, and nearly all Plaice

caught were investigated according to age, sex and length. Otoliths were taken of about 4,600 specimens from 19 different stations.

England.

The Research Ship "George Bligh" between September 1925 and the end of July 1926 made 22 cruises. One cruise was lost owing to the General Strike. The scheme of the year's work was to secure periodic observations and collections for Cod, Herring and Plankton, with Plaice investigations comparable with those of previous years. A cruise was devoted to Hydrography, and when practicable additional Hydrographic work was carried out in the course of cruises planned for fishery research. In the course of the year's work some samples of water were collected for the estimation of Phosphates and of Silica, the Carruthers' Current Indicator was used, and a Densimeter for the determination of Salinity was tested. Collections of fish stomachs were made in all the later trawling cruises, on many of which observations were made bearing on the relation of the size of fish taken and that of the mesh of the net employed: one cruise was devoted entirely to this mesh and size investigation. The main work was allotted thus:—

Cod. Cruises in September, October, November 1925, and in January, March, April and July 1926.

Herring. Cruises in October, November, December 1925, and in March 1926.

Plaice. Cruises in December 1925, and in March, May and June 1926.

Plankton. Cruises in September, and November 1925, and in April, May and June 1926.

Hydrography. Cruises in September 1925. The bulk of the Hydrographic work, however, has been carried out in fishing cruises or by other agencies than the Research Vessel.

The progress made in the various branches of investigation may be summarised as follows:—

FISHERY. Cod. The researches have been directed to Points 3, 4 and 11 of the programme laid down in 1921 and subsequently re-affirmed.

The investigation of the distribution and food of the Cod fry referred to in the Administrative Report for 1924—25, p. 80 has been reported on. (See below).

The problem of age determination of the North Sea Cod by examination of scales has been found to present many difficulties due to irregularities in the formation of "winter" and "summer" zones. This has led to the attempt to define the winter ring precisely by a method which shall rigidly exclude irregularities. The results of this attempt for the first winter are reported on in a paper entitled "A Precise Method for Determining the First Winter Ring in Cod Scales" by Michael Graham, which has been submitted to the Editorial Committee of the Council's Journal.

The age determination work aims at a statement of the growth rate in the early years of the Cod's life and the collection of scales etc., which is nearly complete, is accompanied by hydrographic sampling and by examination of stomach contents. The complete collection is expected to comprise scales from over 5000 fish, collected during three years, giving a sample in nearly every month of the year. The grounds principally sampled lie East of the Yorkshire coast. They are peculiarly interesting in that while they are all within an area of some seventy miles square, they lie in distinct hydrographic environments.

Herring. The investigations have dealt with Points 1, 2, 4, 5, and 7 of the programme laid down in 1921 and subsequently reconfirmed.

Point 1. The observance of this recommendation is secured by the collection of Commercial Statistics.

Point 2. Investigation of unsorted samples. 35 samples of Herrings (about 5000 fish) have been obtained from North Shields, Lowestoft, Hastings, Boulogne, Plymouth and Milford Haven, for the purpose of investigation into the age, length and maturity in the Southern part of the North Sea and English Channel. A report has been published during this period.

Point 4. Distribution of the Younger stages.

A) Three stations on the Southern part of the Dogger Bank were worked with Petersen's Young Fish Trawl in October 1925. Fifty-one post larvae were captured, of which the modal length was 13 mm.

B) In December 1925 3 stations were worked in the English Channel East of 0° and 5 in the Southern Bight, all except one being South of 52° N. the Petersen Young Fish Trawl being used. Significant results of the December cruise were: 1) no larvae were captured in the Channel; 2) recently hatched larvae (under 10 mm.) were caught near the North Hinder L. V. (35 per ten minutes) and near the Sandettie L. V. (128 per ten minutes).

Point 5. Investigation of the Rate of Growth of all Stages.

A) New material for the estimation of rate of growth during the post-larval stage is available from the collections mentioned under 4. (Total 51 from October cruise and 1136 from the December cruise).

B) Collections of young Herring in the Whitebait stage were made on the Northumberland coast by the staff of the Dove Marine Laboratory, Cullercoats, (as yet no figures are available), and it has been arranged to continue these collections in every month until the end of the year. The apparatus which is being used in making these collections is the Lance (Ammodytes) Seine.

C) By using the method of growth calculation on the spawning Herrings of the French coast near Cap d'Antifer, the similarity between these fish and those of the Lowestoft area in Oct.—Nov. was shown. The growth rate of the Herrings of the Western end of the Channel has also been studied.

The areas dealt with during this period were the Southern Bight, the English

Channel and the Irish Sea. Samples taken from the Smith's Knoll region showed that the main spawning shoals were composed of fish one year older than those of the previous season. This is the third year that these Herrings have been followed up, and it is possible that the same fish return each year to the spawning shoals. The new stock — the four year old fish — were again present in these waters.

It has been shown, by growth calculation from the scales, that the Herrings caught off the French Coast at Cap d'Antifer are a mixture of Channel and Southern North Sea fish, and it is probable that most of these late January spawners come from the Southern Bight into the Channel and then return after spawning.

At present, an investigation into the composition of the Herring of the Southern Bight, with special reference to race is in progress, the character at present specially studied being the number of vertebrae, and work is also being done in the Southern Irish Sea to endeavour to find out whether the Drift Fishery affects the Trawl Fishery and *vice versa.*

Point 7. Location of the Spawning Places, especially by the occurrence of the eggs or newly hatched larvae. During the period August—October five records of "spawny" Haddock landed from the Longstone Ground (Northumberland Coast) and three records from the Whitby-Scarborough Ground were obtained from North Shields and Grimsby. Codling full of Herring spawn were reported as having been captured near the Haddock Bank in the beginning of November.

Recently hatched fry were captured in abundance near Sandettie on December 19th, 1925, but none were captured in the Eastern part of the Channel on the 17th December. This and previous evidence points to a lull in spawning between early December (Southern Bight) and beginning of January (Channel).

Plaice. The work of the English Department on Plaice followed the general lines of recommendation of the Plaice Committee in 1921 (Rap. et Proc. Verb. Vol. XXVII p. 52), which laid down that both biological and physical work directed to the further understanding of the ecology of the Plaice and other bionomics of the region be continued.

Ichthyometrics. The measurements of Plaice in the North Sea on board commercial fishing vessels has been continued, — 594,437 Plaice were measured between March 1925 and February 1926, by the 10 measurers employed. The great majority of the work of the measurers was carried out on board Steam Otter Trawlers, but voyages were made also in Sailing Trawlers using the Beam Trawl and Steam Vessels using the Vigneron Dahl Trawl and the Seine nets. In order to interpret the market statistics of Plaice of the various trade categories recognised at the English ports, measurements were made of each category as far as possible every month on Lowestoft, Hull, Grimsby and North Shields markets. Two cruises were made by the Ministry's Research Vessel, in the areas whose closure was proposed, in December 1925 and June 1926. In the former cruise all Plaice caught

were measured (1,550) and in the latter this was not possible as some of the catches were very large, but measurements of 14,000 were secured.

Age and Growth. The continuous line of trawling between the Leman Banks and the Haaks Light Vessel which has been made annually in recent years was carried out in May 1926. Over 3,200 Plaice were caught, the otoliths taken and the age determined. From a study of the results it was found that the growth rate of Plaice was still abnormally slow as compared with pre-war years, and that certain age groups were very abundant while others were relatively scarce. In order to ascertain whether these conditions were common to other parts of the eastern grounds of the North Sea collections of otoliths were made on the cruise in the "Closed Areas" already mentioned at three stations, one in the "Outer Area" near the Vyl Light Vessel and two in the "Inner Area" near Graa Dyb and South of Amurun. The rate of growth of samples at these three stations and at those taken at corresponding depths of the Leman—Haaks line varied somewhat; the size of the Plaice for their age was small throughout. Investigations into the rate of growth are being continued in the hope that they may cast some light on the rapid decline in the stocks of the "Medium" and "Large" Plaice coupled with the corresponding rise in the amount of "Small" which has been so marked a feature of the Plaice fishery in the last two years. A report on the present condition of the Plaice stock of the North Sea is in course of preparation.

Transplantation. In March 1926 a cruise of "George Bligh", to the vicinity of the Haaks Light Vessel for the purpose of obtaining Plaice for transplantation to Poole Harbour on the South Coast of England, was made. This experiment is designed to cast light on the possibility of replenishing this depleted ground. The transplantation tanks were filled with perforated trays, to enable a greater number of fish to be transported than was hitherto the case. 650 Plaice were marked and liberated in good condition. Otoliths of 50 fish were taken for comparison with otoliths to be taken in future from the transplanted fish.

Investigation of the effects to be anticipated from the institution of the measure of closure proposed by the International Council. In order to enable the probable effects of closure to be appreciated, and particularly so that the Fishing Industry in England might be fully advised as to these effects, efforts were made to forecast the results of the protection afforded, both in number and weight of Plaice, and in market value. At the same time the validity of certain adverse criticisms to which the proposal had been subjected was explored. The past researches of the Council, current statistics, and other sources of information provided a considerable basis for the forecasts desired.

The results of the enquiries were circulated to the members of the Committee, to many of whom, and to investigators in Germany the English workers are greatly indebted for valuable information and assistance. The main estimates

of increase of value and main conclusions were summarised for circulation to the industry in England.

Food of Fish. Extensive work was carried out on fish food, both by examination of stomach contents and by observations on the food organisms and their distribution. The objects towards which these enquiries are directed are many. It is desired to determine with greater exactness the fishes which are competitors for the same food, to compare as far as possible the stomach contents with the food on the ground and to gather information as to any connection between the migrations of fish and their food, and to explore any correlation which may exist between the growth rate of the fish and the stomach contents (considered both qualitatively and quantitatively) in different size and age groups and on different grounds. The aim last mentioned, which may well prove of considerable importance, is necessarily one of the more remote. Direct study of the Benthos is undertaken, and particular attention is paid to any indication of preference exhibited by individual species or size groups.

Stomachs of fish have been collected and their contents examined qualitatively and quantitatively as follows:—

Plaice from Leman—Haaks-Line and Eastern Grounds	11,080	
Other Grounds	255	11,335
Cod from the area covered by Mr. GRAHAM's Cod investigations	1,693	
Other Grounds	74	1,767
Haddock from various grounds		110
Whiting — —		1,218
Dabs — —		1,605
Sole — —		50
Brill — —		7
Flounder — —		54
Gurnard (grey) — —		150
Ling — —		1
Thornbacks — —		21
Total fish for all species & grounds...		16,318

The stomach contents of invertebrates have in few cases been examined. The following shows the number for each species on all grounds:—

Astropecton irregularis	170
Asterias rubens	65
Ophiura ciliaris	4
Grangon vulgaris	60
Grangon allmani	296
Portunus holsatus	25

A very limited amount of work has been done with the Petersen Grab, Hunt Sampler and other gear.

Treatment of the above material has not yet gone beyond the tabulation stage, but the results appear to be not incompatible with those of previous workers.

Relation of Size of Fish taken to Mesh. Work has been continued on the effect of different sizes of cod-end mesh on the catch of both round and flat fish and a preliminary note has been published on the results (see below). During the period one cruise of the Research Vessel has been devoted to such investigation and several hauls have been made on other trawling trips. The effect of meshes of 2″, 3″ and 4″ has been tried out both with the trouser trawl and with full-sized cod-ends, definite and consistent results being obtained. A beginning has been made with the study of the effect of meshes of an elongated shape, but these have not yet been fully tested, especially on round fish. The investigations will be continued both at sea and in experimental tanks ashore.

Plankton. The lines of research pursued followed the recommendations of the Plankton Committee 1921, (Rap. et Proc. Verb. Vol. XXVII, p. 36, 38 Point 5, 6) 1923, (the same, Vol. XXXII, p. 22 Point 3, 4). In the main the work has been in accord with Prof. Ostenfeld's recommendation, already cited. It has been mainly devoted to the food of Herring and to the distribution of *Rhizosolenia*, which may be complemental in certain areas to that of abundant aggregation of Herring.

The Plankton staff was engaged for the greater part of the year in working up the collections in hand:—

1) The Plankton of three cruises made in February, April and July 1924, along the western side of the North Sea (see Proc. Verb. Vol. XXXIV, p. 45 "Quarterly Cruises") has been examined and tabulated and shows some interesting features in the horizontal distribution of certain species.

2) During 1923 Plankton was collected at different periods of the year at six stations along a line from Flamborough Head to the Dogger Bank; these samples, along with those taken on the Hydrographic lines from the Tyne to the Naze have also been examined and tabulated; they show that *Calanus finmarchicus* was the dominant Copepod along the English N.E. Coast during the early months of the year, while *Temora longicornis* afterwards predominated; *Calanus* was at a maximum during July and *Temora* in September. The influence of the Northern Atlantic influx was also very marked upon certain species, notably *Limacina*.

3) Another cruise was made during November 1925, for the purpose of securing further data on the winter concentration of *Rhizosolenia styliformis*, and on this occasion it was located in great abundance near the position in which it was found in 1921.

These three series of results will not be reported upon until all the material of the present work on Herring and Plankton has been collected.

During 1926 an intensive study of the relation between Plankton and Herring

food is being undertaken. Plankton is being collected in the regions where Herring fishing is taking place. Vertical and horizontal hauls with the International Plankton net, and oblique hauls with the Petersen Young Fish Trawl are being made, as well as Hydrographic observations (Salinity, Temperature and P_H). A few rough analyses of Plankton samples are being made with a view to finding out what relation, if any, there is between their fat contents and the ripening of gonads in the Herring. Samples of Herring stomachs are being collected regularly by four drifters in order to provide data for correlation with the Plankton results. Three cruises have been made up to date — during April, May and June — and three more are projected for July, August and September. The first cruise took place on the fishing ground off Lowestoft during the unsuccessful spring fishery; the whole of the area was thick with *Phaeocystis poucheti* which clogged the meshes of all the Plankton nets used. During both the May and June cruises — off Shields — the s.s. "George Bligh" worked for one night alongside a Drifter, whilst the latter was fishing; continuous Plankton samples were taken during this period and afterwards 500—600 Herring were purchased from the night's catch of the Drifter and the stomachs preserved for examination.

Hydrography. Surface Observations (Rap. et Proc. Verb. Vol. XXXIV, p. 22 Point 1).

Observations of surface salinity and temperature have been maintained on the following routes and lightvessels (Item 1) Hydrog. Section Rap. et Proc. Verb. Vol. XXXIV, 1924):—

North Sea.

Shields—Oslo	Weekly
Hull—Hanstholm	—
"Smith's Knoll" L. V.	every 4th day
"Varne" L. V.	— —

English Channel.

Newhaven—Dieppe	Weekly
Southampton—Havre	—
Southampton—St. Malo	—
Plymouth—Guernsey	—
Liverpool—Charente[1])	— (approx)
"Seven Stones" L. V.	every 4th day

North Atlantic.

English Channel—W. Indies	Monthly (approx)
English Channel—S. America	— —

[1]) Under the control of the Marine Biological Association, Plymouth.

Water Movements. A report has been issued on the movements of the Bottom Waters of the North Sea, which is based on Drift Bottle Experiments. Two hundred and fifty Surface and a like number of Bottom Drifters were put out at the Hydrographic Stations E 2 and E 3 and on the Southampton—St. Malo steamship line, and of these respectively 52 per cent. and 14 per cent. were recovered by the end of July: a report on the results obtained has been prepared.

Work with Carruthers' Current Indicator has continued at the Varne, Smith's Knoll and Inner Dowsing Light Vessels, in the course of which 201 records of periods of from one to three days' duration was obtained between September 1st 1925, and the end of June 1926.

Work of the Research Vessel. The Hydrographic work carried out by "George Bligh" can be classed as

A) Directed towards the investigation of any relationships between Salinity distribution and current and wind.

B) The study of the Hydrographic conditions on two Cod grounds which appear to differ biologically.

C) Observations in connection with Plankton Investigations dealing with the food of the Herring and with forms occurring in dense aggregations, such as *Rhizosolenia styliformis*.

Gear. An account of Carruthers' Current Indicator has been published.

Experiments have been made with an apparatus designed to facilitate the collection of surface samples. One such apparatus has been in use on an English Channel route for about six months, and has proved useful and on the whole satisfactory. It is hoped that in the newer designs certain minor faults may be overcome.

Tests have been continued with a Densimeter designed by the National Physical Laboratory, Teddington, for the purpose of obtaining Salinity readings at sea; the tests are not yet complete.

Publication of Data. All data from the years 1915 et seq. which have not yet been published have been transmitted to the Bureau of the International Council for publication in the Bulletin Hydrographique, the series of Publications de Circonstance having been terminated (Items 3 & 4 Hydrog. Sect. Rap. et Proc. Verb. XXXIV, 1924).

Arrangements have been made and are now in operation for rapid transmission of data to the Bureau for inclusion in the Quarterly Bulletins (Item 3 Hydrog. Comm. Rap. et Proc. Verb. Vol. XXXVIII, 1925).

France.

En collaboration étroite avec les stationnaires de la Mer du Nord: aviso "Quentin Roosevelt", Garde-Pêches "Estafette" et "Sentinelle" et avec le concours des "drifters" boulonnais et fecampois, les travaux concernant la biologie ou la pêche du Hareng se sont poursuivis de la manière suivante:

I) Lieux de pêche, Statistiques — Conditions hydrologiques et biologiques. Pendant la saison harenguière, la position des pêcheries, les quantités de poissons pêchées ont été soigneusement relevées par les garde-pêches de surveillance sur les bancs ou dans les ports de débarquement du Hareng.

Les temperatures à différentes profondeurs ont été prises, des pêches de plancton ont été faites par l'"Estafette" et la "Sentinelle", sur les pêcheries et les résultats transmis au Laboratoire de Boulogne s/Mer.

Au même laboratoire et pendant toute la saison harenguière, les conditions météorologiques diverses sont relevées et leur influence sur les fluctuations de la pêche recherchées.

II) Mensurations et examen d'écailles. Les échantillons prélevés et de provenances diverses sont mensurés et étudiés suivant les méthodes courantes, les écailles prélevées examinées au point de vue âge et croissance.

III) Lieux de ponte, larves et jeunes harengs. Le laboratoire de Boulogne se préoccupe de rechercher également les lieux de ponte du Hareng, les jeunes larves tirées dans les pêches de plancton et les alevins (white bait) recueillis parmi les bancs de Sprats fréquentant la côte de Boulogne à Dunkerque font également l'objet d'observations suivies.

IV) Limite Sud de distribution du Hareng de la Mer du Nord. (Southern North Sea Type). Les anciens travaux du Laboratoire de Boulogne (Station Aquicole) repris au même laboratoire et en collaboration avec M. Hodgson ont permis d'établir d'une façon précisé la limite Sud d'extension du Hareng de la Mer du Nord. Actuellement cette limite peut être fixée sur la ligne Antifer—Newhaven; plus au Sud, en baie de Seine se trouvant un mélange des deux types: Southern North Sea Type et Harengs de la Manche (Channel's Herring ou Channel Type) variété différente. Les mouvements de ces harengs de la Mer du Nord ont pu également être précisés. Des captures de harengs "guais" (spents) faites soit aux filets dérivants, soit au chalut, après la saison de ponte dans le Nord de la Manche: (Fin de Janvier et Février) et dans les parages de Gris-Nez, entre le Gabbard, le Galloper et le North Hinder semblent nettement établir que l'on se trouve en présence de Harengs ayant déposé leur frai et reprenant leur mouvement migratorial vers le Nord-Est, verifiant ainsi l'hypothèse émise par M. Hodgson.

La capture d'un lot de Harengs du Groupe I en Mars 1926 par le chalutier "Degoutte" dans les parages du Coal Pit et du Sole Pit vient encore confirmer ces hypothèses d'un mouvement limité du "Southern North Sea Type".

Holland.

FISHERY. Herring. A study has been made of the Herring found in Dutch estuaries: this investigation is relevant to a feeling, common among fishermen, against the capture of small Herring for their scales, (which are used in the manu-

facture of imitation pearls). The immigration of North Sea Herring into the southern estuaries could be traced, and later the appearance of the larvae of a brackish water spring Herring which spawns in the East Schelde and adjacent waters. The research dealt with these larval Herring and with the first year Herring on which the fishery for the scales is based.

Hauls were made with Petersen's Young Fish Trawl on the Northern Herring Grounds also, from the Police Vessel "Triton".

Plaice. The "Triton" trawled in the vicinity of the Haak's Light Vessel in May 1926 for the purpose of collecting material for age and growth determination of Plaice. This work was carried out in co-operation with the English Research Vessel, and was complemental in character, as the hauls were made inshore of the positions of the English vessel. A small trawl was used, and over 1,300 Plaice were taken, all of which were dealt with, complete records of length, sex and age being sent to England.

The following publications upon Fishery and related Investigations dealing with the Area have appeared in the countries represented on the Southern North Sea Committee and in Germany.

BELGIUM

GILSON, G. "L'Exploration de la Mer au point de vue des pêcheries". Conférence faite au "Congrès National d'Expansion Maritime et Coloniale" réuni à Ostende le 27 août 1925.

DENMARK

JOHANSEN, A. C. "On the Diurnal vertical movements of the young of some fishes in Danish waters". Medd. fra Komm. for Havund. Serie Fiskeri, Bind VIII, 1925.

JOHANSEN, A. C. & JENSEN, A. J. C. "Remarks on the Influence of the Currents in the Waters about Denmark upon the Climate of Denmark and Neighbouring Countries". Rep. from Phys. Papers (dedicated August Krogh) 1926.

PETERSEN, C. G. J. "A Brief Survey of the Animal Communities in Danish Waters, based upon Quantitative Samples taken with the Bottom Sampler". (From the American Journal of Science, Vol. VII, May 1924).

POULSEN, ERIK M. "Om Kullerens Føde i Nordsøen". Dansk Fiskeritidende, March, 24, 1926.

Report of The Danish Biological Station to The Board of Agriculture.

BLEGVAD, H. "Continued Studies on the Quantity of Fish-Food in the Sea Bottom".

SPÄRCK, R. "A Comparison between the Danish Oyster-Beds and those in Holland and the South-West of France".

ENGLAND

BORLEY, J. O. & THURSBY-PELHAM, D. E. "Distribution of the Food Fishes in the North Sea during 1923 and 1924, with Notes on the Natural History of the Food Fishes of the North Sea". Fishery Investigations, Series II. Vol. IX, No. 4 (in the Press) 1926.

CARRUTHERS, J. N. "The Water Movements in the Southern North Sea. — Part II. The Bottom Currents". Fishery Investigations, Series II. Vol. IX, No. 3, 1926.

— "A new Current Measuring Instrument for the Purpose of Fishery Research". Journal du Conseil, Vol. I, No. 2, 1926.

GRAHAM, M. & CARRUTHERS, J. N. "The Distribution of the Pelagic Stages of the Cod in the North Sea in 1924 in Relation to the System of Currents". Fishery Investigations, Series II. Vol. VIII, No. 6, 1925.

HARDY, A. C. "The Herring in Relation to its Animate Environment. Part II. — Reports on Trials with the Plankton Indicator". Fishery Investigations, Series II. Vol. VIII, No. 7, 1925.

HODGSON, W. C. "Investigations into the Age, Length and Maturity of the Herring of the Southern North Sea. Part II. — The Composition of the Catches in 1922—1924". Fishery Investigations, Series II. Vol. VIII, No. 5, 1925.

RUSSELL, E. S. & EDSER, T. "The Relation between Cod-end Mesh and Size of Fish Caught. Preliminary experiment with the Trouser Trawl". Journal du Conseil, Vol. I, No. 1, 1926.

SAVAGE, R. E. "The Plankton of a Herring Ground". Fishery Investigations, Series II, Vol. IX, No. 1, 1926.

BUCHANAN-WOLLASTON, H. J. "Plaice Egg Production in 1920—21". Fishery Investigations, Series II, Vol. IX, No. 1, 1926.

FRANCE

LE GALL, J. "Études diverses sur le Hareng". No. 48. Notes et Rapports de l'Office Scientifique et Technique des Pêches Maritimes.

LE DANOIS, ED. Rapport sur les Travaux de l'Office depuis son Origine. No. 50. Notes et Rapports de l'Office Scientifique et Technique des Pêches Maritimes. 1926.

GERMANY

BÜCKMANN, A. "Prof. Garstang's Ansicht über die Ueberfischung des Schollenbestandes in der Nordsee". Der Fischerbote, XVIII. Jahrg., Heft 12, 1926.

HAGMEIER S. "Ueber Austernkultur an Deutschlands Küste". Mitteilungen des deutschen Seefischerei-Vereins. März 1926.

HEINCKE, FR. & BÜCKMANN, A. "Die Ueberfischung der Nordsee und die Wirkungen der Kriegsschonzeit auf ihren Schollenbestand". Der Fischerbote, XVIII. Jahrg., Heft 3, 1926.

KYLE, H. M. "Ueber das Wachstum des Steinbutts (*R. maximus* L.)". Der Fischerbote XVIII Jahrg. Heft. 9. 1926.

LISSNER, "Der Trawlheringsfang 1925". Der Fischerbote XVIII Jahrg. Heft. 2. 1926.

HOLLAND

TESCH, J. J. "Rapport aangaande der Pufvisscherij". Verslagen en Meddedeelingen van der Afdeeling Visscherijen, No. 9, 1925.

TRANSITION AREA

1925—1926.

By

A. C. Johansen

At the meeting of the International Council in Copenhagen in September 1925 it was resolved that the chairman for the Transition Area Committee should draw up a proposal for the programme of investigations, which should be circulated among the members of the Committee for consideration. This was done in September 1925, but it was suggested by Professor Otto Pettersson that a meeting of the Committee ought to take place in order that the programme should be discussed more fully, especially with regard to investigations with saving gears. Such a meeting was held in Göteborg in February 27th—28th, 1926, where all members of the Committe were present, and besides: Captain Drechsel, Dr. G. Ekman, Professor Hjort, Dr. Martens, Dr. Molander and Dr. Nybelin. The following General Programme for international investigations in the "Transition Area" was adopted:—

1) The study of the life-history of the more important food fishes, such as the Herring, Plaice, Cod, Haddock, Eel, Turbot, Brill, Witch, Flounder, Dab, Mackerel, Garfish, Lumpsucker, Sprat, Salmon and Sea Trout should be continued. It should be studied which of these species are represented by peculiar races in the "Transition Area".
2) General fishery statistics should be collected from all countries bordering on the Skagerak, Kattegat and the western Baltic. The statistics should comprise
   a) Quantity and value of all food fishes caught;
   b) Number, value and size of fishing vessels, distinguishing between steamers, motor vessels and sailing vessels; c) Number and kind of fishing vessels; and
   d) Number of men employed in the fisheries.

   It is considered important that the statistics should give information about the catch for each species in each month of the year.
3) Special fishery statistics should be collected for certain important food fishes, such as the Plaice, the Flounder, the Turbot, the Witch, the Haddock etc., concerning catch per fishing unit, and lengths of the specimens etc.

4) The selective effect of different fishing gears with and without special saving apparatus should be studied.
5) Special stress should be laid upon work tending to study the fluctuations in the yield of the fisheries of the more important food fishes, such as the Herring, Plaice, Cod, Haddock, Eel and Mackerel etc. and to elicit the causes thereof. The following factors should here be considered:
   a) Migrations of the fishes, and their dependance upon physical factors, such as the current, the temperature, salinity, oxygen-contents, etc.
   b) Good and bad survival years for the brood, and their dependance (directly or indirectly) upon physical factors.
   c) Good and bad growth-years for the various species and their dependance upon physical factors.
   d) The influence of an intensive and long-lasting fishing.
6) Transplantation experiments should be carried out with the plaice and other fishes in order to demonstrate variation in growth in connection with variations in the environments (such as salinity, density in the fish population etc.).
7) The variations in the salinity and temperature in the "Transition Area" should be followed by means of observations from the light vessels and from the research steamers etc. The more important variations observed should be correlated with fluctuations in certain of the fisheries.
8) The transition and mixing of the different watermasses should be studied as closely as possible, by current measurements from light vessels, research vessels or by other adequate means.
9) Investigations should be made as to the physical and biological conditions of the sea bottom, and as to the variation in the amount of certain invertebrates which are of great importance as food for the Plaice and certain other fishes.
10) Quantitative and qualitative investigations as to the Plankton should be made in connection with fisheries and hydrographical investigations.
11) The diurnal vertical movements of fishes and other swimming animals and plankton organisms should be studied, partly in connection with investigations as to the light-contents of the various water layers.
12) The life history of some marine mammals, such as the Seals and the Porpoise, should be studied, especially regarding their relation to fishes. Statistics as to the catches of each of these species should be collected and published.
13) The life history of some important invertebrates, such as the Lobster, the Norwegian Lobster, the Edible Crab (*Cancer pagurus*), the Prawns (*Palæmon fabricii* and *Pandalus borealis*) and the Shrimp (*Crangon vulgaris*) should be studied. Statistics as to the catches of each of these animals should be collected.

On the meeting it was resolved that the following investigations should be undertaken in the near future:—

a. The Herring.

Denmark. The racial investigations should be continued in connection with investigations as to the situation of the spawning places of the different races.

At the end of April or beginning of May investigations should be made from the "Dana" on the occurrence of the North Sea Herring in the south western Skagerak. — In October investigations should be undertaken as to the intensity of spawning in the Baltic E. of Moen and Falster, the Sound, the eastern Kattegat and the Jutland Bank area.

Sweden. In the month of March investigations should be made from the "Skagerak" concerning the occurrence of the North Sea Herring in the Skagerak and the food taken of this Herring. In the month of June it should be investigated if the Herring is to be found along the southern slope of the deep Norwegian Channel and if Schizopods (Meganyctiphanes etc.) occur there.

In October investigations should be undertaken as to the occurrence and frequency of newly hatched herring larvae in the Baltic S. of Sweden and in the Bornholm region.

In November the occurrence and frequency of the Herring in the Skagerak should be investigated.

b. The Sprat.

Norway. The investigations made in Norway by Dr. Bjerkan should be extended also to the Transition area.

c. The Haddock.

Denmark. The study of the composition of the stock of Haddock in the Belt Sea, Kattegat and Skagerak should be continued in the spring of 1926. Investigations should be made as to the size of Haddock landed in Frederikshavn and Esbjerg.

Sweden. Statistics should be collected regarding the quantities of different size-categories of Haddock landed in Göteborg. Once a month measurements should be made of representative samples of the various size-categories.

d. The Plaice.

Denmark. The study regarding the frequency of the 0-Gr. and the composition of the stock of the older year classes should be continued. Transplantation experiments would probably be undertaken.

Sweden. The investigations about the influence of the fishery upon the stock of plaice in the Arkona-basin and the Bornholm-deep should be continued in order to demonstrate whether new measures of protection are desirable.

e. The Witch *(Pleuronectes cynoglossus).*

Sweden. In June a cruise to the middle and northern part of the North Sea should be undertaken in order to continue the investigations as to the situation of the spawning places for this species.

f. The saving trawl.

It was resolved that the chairman should submit to the Central Bureau to occasion an international investigation as to the question whether it is desirable to substitute the ordinary otter-trawl with a modified otter-trawl which saves a greater proportion of the small fish than the usual otter-trawl, and whether any of the trials made hitherto regarding the construction of special saving-trawls has been successful.

The following work has been carried out by the various countries.

Norway. Herring-Investigations. Age analyses of Herrings caught in the Skagerak in the spring of 1926 have been undertaken by Dr. Lea.

Cod-Investigations. Director Dannevig has continued his investigations as to the stock of Cod off the south coast of Norway in connection with the yearly output of Cod fry from the hatchery of Flødevigen.

Sweden. During the period October 1925—March 1926 several cruises with the research steamer "Skagerak" were undertaken in the Skagerak and eastern Kattegat. In May and June 1926 a cruise to the western Skagerak and the North Sea was undertaken. The western Baltic was visited in October 1925 and August 1926.

Witch-Investigations. It was found that some few specimens of *Pleuronectes cynoglossus* are spawning at the southern slope of the Norwegian Channel in the western Skagerak, but that the main spawning area for the Skagerak-stock is situated in the middlemost and northern part of the North Sea. The Skagerak is to be looked upon in the main as a growth-area for the Witch.

Plaice-Investigations. In the autumn of 1925 and spring of 1926 a series of fishing experiments were undertaken in the fiords of Bohuslän. From these experiments it appeared that the Plaice, which formerly were very frequent there, had decreased strongly in numbers.

Experiments were made in aquariae of the Zoological Station of Kristineberg in order to investigate how various hydrographical factors influence the nourishment and growth of the Plaice.

In the Arcona-basin material was procured in order to study the influence of fishing upon the stock of Plaice.

Herring-Investigations. During the winter-fishing in the Kattegat and Skagerak several samples of Herring were collected for age determinations and racial investigations. During the above named summer-cruises several fishing experiments with drift nets were undertaken in the western Skagerak, and in some places fairly good catches were taken.

Much time has been spent upon investigations of the occurrence of certain Schizopods in the Skagerak, especially *Meganyctiphanes norvegica* and their importance as food for fishes, especially the Herring. The diurnal vertical movements of *Meganyctiphanes* was studied, and it was possible to find a connection between the occurrence of the Herring and this species of Schizopods. It was found that *Meganyctiphanes norvegica* occurred in the Skagerak also during the summer (May, June), at depths of about 150 metres, while during the winter it occurred where the depth was abt. 75—100 metres. Also during the summer the Schizopods were pursued by the Herring.

Cod-Investigations. In October 1925 otoliths were taken of a great number of Cod from the Skagerak and Kattegat.

Haddock-Investigations. Statistics of the landings of the various size-categories of Haddock were procured in Göteborg, and measurements were undertaken as far as possible once a month. Otoliths were collected in October 1925.

Plankton-Investigations. The transport of fish eggs and larvae etc. with the currents was studied at the mouth of Gulmarfiord twice a week.

Hydrographical Investigations. The hydrographical investigations onboard the research steamer "Skagerak" have been carried out in connection with biological investigations.

As the Swedish Hydrographical Biological Commission has desired to extend its investigations further out in the Norwegian Channel and to the slope of the North Sea towards the Norwegian Sea, the Commission has applied for means for procuring apparatus for deep-soundings and has for this purpose improved and augmented its instruments, and worked for improvements after new principles, which should be described under the following titles:—

Improvements in hydrographical technique.

I) A registering Thermophotograph by V. Pettersson
II) A new Planktoncatcher by V. Pettersson
III) A new Currentmeter for absolute determinations of the movements of the bottom water by O. Pettersson
IV) A new Bottomcatcher by O. Pettersson.

A special work has been carried out concerning trials and improvements of the Swedish "Skontrawl", which should be laid before the Consultative Committee in Copenhagen in September 1926.

Denmark. The research vessel "Dana" was used for investigations in the Transition Area and adjacent parts of the North Sea in the following periods:—

1) from 2nd to 21st of October 1925
2) — 1st to 3rd of April 1926
3) — 26th of April to 12th of May 1926.

A motorboat was employed in the Belt Sea for Plaice-investigations from the 13th to 16th of July and from 10th to 22nd of August 1925. Material for investigations of Plaice, Haddock and Herring was procured from commercial fishing-vessels at various times of the year.

Plaice-Investigations. By fishing experiments from motorboat with young-plaice-trawl in the Belt Sea in July and August 1925 it was found that the number of Plaice of the year-class 1925 was more frequent than is normally the case. From the Danish Biological Station it was observed that the same was the case in the western part of the true Baltic (See Report XXXII from the Danish Biological Station. 1926).

Herring-Investigations. In the cruise of the "Dana" in October of 1925 it was demonstrated by fishing experiments with ring-trawl that an important spawning place for the South Baltic Autumn Herring occurred on the slopes and banks East of Sealand, Møen and Falster, from Køge Bugt in the North to Kriegers Flak and E. of Falsterbo Reef in the East. A short note on these investigations is published by A. C. Johansen in "Dansk Fiskeritidende" for 3rd February 1926.

At the end of April and in the beginning of May 1926 a series of fishing experiments with a herring trawl with 3 boards were undertaken from the "Dana" in the southern and western Skagerak in order to catch the autumn spawning North Sea Herring and to study its food etc. The North Sea Herring was not caught, but samples of various local races of Herrings were found and investigated. It was demonstrated that *Meganyctiphanes norvegica* played a very great rôle as food for the Herring there, as well as for Mackerel, Haddock, Whiting, Long-Rough-Dab etc. A note about this investigation has been published by Erik M. Poulsen in "Dansk Fiskeritidende" for June 16th, 1926.

The racial investigations of the Herring from various parts of the Transition Area have been continued.

Cod-investigations. A series of fishing experiments with ring-trawl were undertaken from the "Dana" in the Skagerak, Kattegat, Belt Sea and western part of the Baltic in April and May of 1926 in order to study the frequency of the larvae of the Cod and Haddock and other fishes. It was found that the frequency of the cod-larvae was below the normal. The investigations in the previous years have given the following result:—

1923 more larvae than normally
1924 probably less larvae than normally
1925 more larvae than normally.

In agreement with these investigations a series of age analyses of Cod from the Belt Sea in the Spring of 1926 gave the result that proportionately many specimens belonged to the year classes 1923 and 1925 and proportionately few to the year class 1924.

Haddock-Investigations. An abnormally great Haddock fishery took place in the Belt Sea and southern Kattegat during the winter of 1925—26. By age analyses it was found that about 99 per cent of the specimens captured in the Belt Sea belonged to the year class 1923. The causes of this strange occurrence appeared to be as follows: There was an abnormally strong inflow of salt water from the Skagerak to the Kattegat and from the Kattegat to the Belt Sea in the spring and early summer of 1923. On account of this great inflow many more Haddock were spawning in the Kattegat than usually. Moreover, very many haddock-larvae were transported from the Skagerak to the Kattegat and further into the Belt Sea by the strong under-current; and finally, the year 1923 was a very good survival year for the young Haddock in the North Sea and the Skagerak.

The Danish Haddock-investigations in the Kattegat and Belt Sea in 1925 and 1926 have been treated by A. C. Johansen in the following periodicals:—

1) "Dansk Fiskeritidende" for 21st April 1926
2) "Dansk Fiskeritidende" for 26th May 1926
3) "Journal du Conseil" for May 1926
4) "Mitteilungen des deutschen Seefischerei-Vereins" for June 1926.

Plankton-Investigations. P. Jespersen, M.Sc. has continued his investigations as to the food and the feeding time of the young stages of the Herring. Some observations have been made regarding the diurnal vertical movements of some Plankton-Crustaceans.

Hydrographical Investigations. On the cruises of the "Dana" in the Transition Area determinations of temperature, salinity, contents of oxygen etc. were undertaken at the various stations. On the cruise from 2nd to 20th of October, 1925, 230 determinations of temperature and salinity and 40 determinations of oxygen contents were undertaken. On the cruises from April 1st to May 22nd, 1926, the corresponding figures were 450 and 170. The material has been sent to the Bureau du Conseil International.

At my request the Danish Hydrographical Laboratory (Director: Professor Martin Knudsen) has undertaken some investigations as to the amount of CaO in water of different salinity in the Transition Area and the adjacent parts of the North Sea. The results of the analyses are shown in the annexed table.

The table shows that the amount of Ca is nearly proportionate to the amount of Cl in water of more than 20 ‰ S. and that the value $\frac{Cl}{Ca}$ decreases with the decreasing salinity in water of lower salinity. The value $\frac{CaO}{Cl}$ accordingly increases with the decreasing salinity in water of less than 20 ‰ salinity.

Table showing contents of *Cl* and *CaO* in sea-water of different salinity[1]).

Date	Locality	*Cl* ‰	Sal. ‰	*CaO* mg/Litre	$\frac{Cl}{Ca}$ milligr.
29th July 1924	Ringkøbing Fjord South of Stavning Pynt	3.09	5.61	114	38
30th July 1924	Ringkøbing Fjord North of Tipperne.....	3.46	6.28	122	40
30th July 1924	Ringkøbing Fjord Outlet of Gødelen.....	4.63	8.39	155	42
15th Jan. 1926	The Sound at Eltham	5.11	9.25	182	40
26th Jan. 1926	The Sound at Eltham	10.68	19.31	330	46
14th March 1922	Great Belt, surface	10.96	19.81	314	50
14th March 1922	Great Belt, surface	10.99	19.87	315	50
17th Octbr. 1925	North Sea 55°28′ N. 8°11′ E. ("Dana" St. 3509)	17.79	32.14	535	48
16th Octbr. 1925	North Sea 55°27′ N. 7°15′ E. ("Dana" St. 3508)	18.49	33.40	545	49
16th Octbr. 1925	North Sea 55°27′ N. 6°53′ E. ("Dana" St. 3507)	18.56	33.53	555	48
20th Octbr. 1925	North Sea 55°27′ N. 6°07′ E. ("Dana" St. 3518)	19.05	34.42	(468[2]))	(58)

[1]) The analyses have been undertaken by Dr. J. P. Jacobsen.

[2]) The determination is probably incorrect.

BALTIC AREA

1925—1926.

By

K. A. Andersson.

At the meeting of the International Council in Copenhagen in September 1925 it was resolved, that the chairman of the Baltic Area Committee should draw up a proposal for the programme of investigations, which should be circulated amongst the members of the Committee for consideration. This was done in February 1926.

After some additional amendments made by the members of the Committee the programme should be as follows.

The Baltic Herring.

In a recently published paper (The Herrings along the Baltic coast of Sweden, Publications de Circonstance, No. 89) the author, Dr. Chr. Hessle, gives a report of the races, distribution, spawning-places, spawning-seasons, rate of growth and the frequency of the different year-classes, as well as the food of the herrings along the Baltic coast of Sweden. These investigations, which were, of course, only intended to give a general idea of the problems regarding the Baltic herring, are to be continued on a larger scale in the Baltic Area.

Considering the great importance of the fluctuations in the year-classes for the fisheries a stress ought also to be laid upon the studies of these fluctuations. According to the paper referred to, the Swedish fisheries among the autumn spawning herring, which is the most important of the races in the Central Baltic, have, from the year 1921 onwards, been chiefly based on the rich year-classes of 1917 and 1918. After 1918 the year-classes have been very poor, which has also caused a great decrease in the herring-fisheries for the years 1924 and 1925. In the samples taken from catches in these two years, the 1922 year-class has been rather rich, but it is still doubtful whether this year-class can increase the fishery. It will be of great interest to investigate the year-classes in the different parts of the Baltic (including also the Gulf of Riga).

At the same time it is of importance to investigate the causes of these fluctuations. If the causes are to be found solely in the hydrographic conditions,

it may be of great importance to study the year-class of 1925, as the temperature of the upper water-layers during the autumn of 1925 was 2—3° higher than during the previous years. This was at least the case with the Central Baltic. It will be of great interest to investigate whether this unusually high temperature of the water has affected the year-class of 1925, and if so, in what direction.

Certain reasons speak in favour of the opinion, that the herrings avoid the water-layers below the 70 m. level of the Central Baltic, which always seems to be very destitute of oxygen, while in the Gulf of Bothnia, where no such deficiency of oxygen is prominent, this fish seems to descend to rather great depths. This ought to be more closely investigated.

On the Baltic coast of Sweden, no samples of the post-larval stages of the autumn spawning herrings have yet been procured. It may, therefore, be of interest to find out where these herrings live during their first year.

The Sprat.

Investigations of this fish have for some years been carried on along the Swedish coast of the Central Baltic. In several respects the sprat seems to make the same migrations as the autumn spawning herring, but also in the case of the sprat the habits and migrations during the first year are as yet unknown in the Baltic. This fish ought also to be the object of the investigations of the Committee.

The Cod.

During the latter years the biology of the Baltic cod has been studied by Swedish scientists. The results of these investigations are laid forth in a paper "Fiskeribiologiska undersökningar i Östersjön och Bottniska viken" by K. A. Andersson, Chr. Hessle, A. R. Molander and O. Nybelin (Meddelanden från Kungl. Lantbruksstyrelsen no. 243, 1923). In this paper, the distribution, spawning, growth, periodicity of the year-classes etc. of the cod have been dealt with. These investigations, which only comprise the areas in the vicinity of the Swedish coast, ought to be extended to other parts of the Baltic Area.

During the Swedish investigations, the fry and eggs of the cod have been found in several parts of the Central Baltic, but only below the 70 m. level. In the Sea of Åland and the Gulf of Bothnia, no eggs or fry of the cod have been caught, in spite of the fact that the cod also spawns in these parts of the Baltic. The occurrence here of the eggs and larvae of cod ought to be further investigated.

We do not yet know in which stage the young cod in the Baltic Area begin to migrate into shallow water, and our knowledge of the habits of the cod during the 0-group-stage is on the whole very fragmentary. These problems ought to be investigated.

Also as regards the cod the Swedish investigations have shown great fluctuations in the strength of the different year-classes. Thus the rich cod-fishery on the Swedish coast during the years 1919—1921 was chiefly based on the strong year-class of 1917. It would certainly be of interest to continue these investigations.

As regards the causes of the changes in the strength of the year-classes, it should be kept in mind, that the cod of the Central Baltic spawn at a depth of 80 m. or more. Consequently, the spawning takes place in water with very inconsiderable changes in the temperature and salinity, besides which, this water is constantly very destitute of oxygen. It is therefore hardly probable that the fluctuations in the year-classes of the cod are due to different hydrographical conditions during the spawning, but more likely to other circumstances, as for instance the supply of food for the earlier stages.

Changes in the oxygen-content of the water during or after the spawning may, however, to a certain extent provoke fluctuations in the strength of the year-classes. These problems ought to be studied. An investigation of the food of the earlier stages of the cod may be of use for the settlement of these questions.

Marking experiments with cod for investigations of its migrations have been made on the eastern coast of Gothland (*vide* "Fiskeribiologiska undersökningar etc." pag. 34 and 72). These investigations seem to indicate that the cod in the Baltic ara very stationary. More such experiments ought, however, to be made in order to obtain a full judgement of the migrations of the Baltic cod.

Other marketable salt-water fishes as *Pleuronectes flesus*, *limanda* and *platessa* and *Rhombus maximus* ought also to be studied as to their life-history. Regarding these flat-fishes, preliminary investigations have been made along the Swedish coast (*vide* "Fiskeribiologiska undersökningar etc.") but these investigations ought to be extended to other districts of the Baltic Area.

The Salmon.

In studying the age and growth of the Baltic salmon by means of scale-reading it has been found, that the young salmon live 3—4 years in the northern rivers of Sweden before their descent to the sea, while they only stay 2—3 years in the rivers in the southern parts of Sweden before the descent. (G. Alm: Mörrumsåns lax och laxöring etc. with a German summary; Meddelanden från Kungl. Lantbruksstyrelsen no. 216, 1919 and others). Furthermore, an investigation of the scales of a number of salmon caught in the Southern and Central Baltic seems to show, that a great part of these salmon originate from the rivers falling into the northern part of the Baltic. Consequently, a general investigation, by means

of scale-reading, of how long the young salmon stay in the different rivers before the descent to the sea, would be of great interest, as by such an investigation one might be more able to follow the migrations of the salmon in the Baltic. It is therefore proposed that investigations should be made regarding the age and growth of the salmon in the rivers as well as in the Baltic.

Plankton investigations.

The plankton plays a great part in the food-production of the sea, and is of great direct importance as fish-food. Fluctuations in the amount of plankton may therefore provoke fluctuations of the stock of fish. In 1925, a quantity of plankton samples were collected at some stations between the Swedish mainland and Gothland from different depths during each month from May to October. Similar investigations, and especially those regarding schizopods and copepods, which animals are of the greatest importance as fish-food, ought to be continued and extended to other parts of the Baltic.

Some plankton-forms, which are of direct importance as fish-food, as for instance the schizopods in the Skagerak, have been found to stay deeper during the day than during the night. Therefore investigations of the daily vertical migrations of the schizopods and copepods ought to be made. In connection with these investigations, the vertical migrations of the fishes (herring and sprat) and fish-larvae ought to be studied.

Seals.

As seals are very abundant in the Baltic, especially in its northern parts, and as they obviously do great damage to the fishery, the life-history of these animals ought to be further studied, and if possible, material collected in order to obtain a general idea of the damage they cause to the stock of fish. The distribution and migrations of the different species of seal ought to be further studied. Statistics of seals killed in the different countries should be collected.

Hydrographic investigations.

In the hydrography of the central parts of the Baltic, from Bornholm to the Sea of Åland, the inflowing current of oceanic water along the bottom plays a dominating part. Owing to the absence of a pervading vertical circulation, caused by the relatively low density of the upper water-layer, the bottom-layer is deprived of any direct connection with the atmosphere, and consequently ventilation of this latter layer is quite impossible. The salinity and gas-content, and also, to a very great extent, the temperature of this layer are consequently regulated by the oceanic water flowing into the Baltic over the barriers in the Belts and the Sound. The extent, rapidity and periodical fluctuations of this under current have for two decades been the object of the investigations of Swedish hydrographers.

A great material of current-measurements has been collected from the area near the mouths of the Baltic and from the Arkona Basin, as well as from the submarine connection between these areas and the Bornholm Basin. This material, improved by numerous series of hydrographical sections and soundings, is certainly well worth a uniform investigation from a hydrodynamic point of view. This material from the Southern Baltic ought also to be completed by current-measurements, with self-registering instruments in the areas east and north of Bornholm and eventually also S.E. of Gotland, in order to prove the occurence of the inflowing bottom-current which, judging from gas-analytic measurements, is probably also to be found here.

The investigations hitherto carried out have shown that the influence upon the different water-layers of the oceanic water flowing into the Baltic, (salinity, oxygen-content, etc.) proceeds very slowly into the Baltic basins (it takes about two years for this water to reach the different large basins). These conditions can best be studied by investigations carried out as simultaneously as possible. It is therefore desirable to arrange for research cruises from the different countries to be undertaken at the same time, if possible. For the study of the annual fluctuations in the water-layers it seems sufficient to examine the hydrographical conditions, only once a year. Experience shows that the month of July is most suitable for this work, and it is to be expected that the cruises from Finland and Sweden will be carried out during this month.

In order to understand the movements of the water-layers in the Baltic it is important to make continuous observations of the alterations in shorter periods. For this purpose, continuous observations from lightships and coast stations are of great value. It is therefore desirable that these observations should be continued, and that more such stations be established where they are now scarce, especially on the south and south-east coast of the Baltic.

For modern dynamic treatment of the movements in the sea, information as to the height of the water is necessary. It is desirable that such information should be available from the whole of the Baltic coast.

In order to understand the circumstances which regulate the content of oxygen and carbon dioxide in the sea, a study of the equilibrium conditions is necessary. The investigations of this matter carried out by the Thalassological Institution in Finland in the northern part of the Baltic should be continued.

The investigations concerning the gas-contents of the deeper layers, which Dr. Schultz carried out in 1922 from Skagerak right up to the innermost part of the Botten Bay should be repeated on a reduced scale by studying the contents of oxygen and, if possible, also that of carbon dioxide at Schultz's stations east and west of Gotland and inside Bornholm.

The continuous hydrographical observations down to the bottom-layer, which have for several years been made outside Märket, Visby and Bornholm ought to be continued.

For the study of the life-conditions in the sea, investigations of the circulation of the nitrogen and the penetration of the light into the water are desirable.

In accordance with the points of view mentioned above, the programme for the Baltic Area ought principally to comprise the following investigations:—

I. The Baltic herring.

1) The different races, their characters, distribution, spawning-time, spawning-places and growth.
2) The horizontal and vertical migrations of the different stages of the herrings especially during their first year.
3) The food of the herring and the dependance of the migrations thereon.
4) The fluctuations of the different year-classes and their causes.

II. The Sprat.

1) The stock and distribution of this fish, spawning-time, spawning-places, growth, age, and especially its life during its first year.

III. The Cod.

Investigations of the life-history of the cod with particular attention to the study of the following questions:—

1) The occurrence of eggs and larval stages, especially in the Gulf of Bothnia.
2) The food of the cod, especially during its earliest stages.
3) The time of the ascent of the young cod to shallow water, and especially the occurrence of the 0-group stage.
4) Investigations regarding the migrations of the cod by marking experiments.
5) The fluctuations in the different year-classes, and the causes of these fluctuations.

IV. Flounder, Dab, Plaice and Turbot.

Investigations as to the life-history of these fishes.

V. The Salmon.

Investigations of the migrations of the salmon in connection with studies of the age and growth of this fish in the Baltic as well as in the rivers falling into this sea.

VI. Plankton investigations.

1) Investigations of changes in the plankton during different months and years, especially regarding those organisms, such as schizopods and copepods, which are of the greatest importance for the fish-food.
2) The daily vertical migrations of the plankton-organisms, especially the schizopods and copepods, as well as the vertical migrations of the fishes (herring, sprat and fish-larvae).

These investigations could undoubtedly be carried out with good results by means of the apparatus demonstrated at the last meeting at Copenhagen by Messrs. Otto and Vilh. Pettersson.

VII. Statistics.

General fishery statistics ought still to be collected in each country at the Baltic according to the earlier programme of the "Baltic Committee".

VIII. Seals.

The life-history of the three different species of seal which occur in the Baltic should be further studied, especially as regards the damage to the stock of fish, and the distribution and migrations of seals in the Baltic. Statistics regarding the yearly number of seals killed ought to be collected.

IX. Hydrographical investigations.

1) It is desirable that the hydrographical cruises in the Baltic should be carried out in the month of July in order to obtain a total view of the hydrographical conditions of the Baltic.
2) In connection with the biological investigations, observations should be made as to the temperature, salinity and gas-content of the water, as well as of the penetration of light into the water.
3) Hydrographical observations of temperature, salinity and currents should be continued from lightships or other coast stations round the Baltic, and developed to a continuous chain of stations.
4) Hydrographical observations down to a depth of 80 à 100 m. should be continued at Märket, Visby and Bornholm.
5) Current-measurements for the study of the bottom-current.
6) The conditions of the chemical equilibrium are to be studied at sea and in the laboratories, specially as to the content of carbon dioxide and nitrogen.
7) It is desirable that observations of the water-level should be published, preferably from mareographs for the same hours (0, 4, 8, 12, 16, 20 Greenwich mean-time) and in about the same manner, as already in Finland and Sweden.

The following work has been carried out by the various countries: —

Denmark. Herring investigations. A number of herrings from East of Bornholm have been investigated as to length, age, maturity and racial characteristics.

Plaice investigations in the Bornholm Deep.

On June 14th, 1923 143 plaice caught from the "Dana" were marked in the Bornholm Deep.

The following numbers have hitherto been recovered: —

In the course of the 1. year after liberation: 9 specimens
- - — - - 2. — — — 10 —
- - — - - 3. — — — 9 —

Esthonia. Hydrography. The following report has been received from Capt. W. Dampf.

At the Hydrographical Department of the University of Dorpath regular observations regarding the height of the water-level are carried out at the following lighthouses: Svalferort, Filsand, Tachkona, Loksa, Stenskär and Worms. There are also selfregistering water-level apparatus in operation (the Rordanz system) at Reval and Arensburg. The temperature and salinity near the surface of the water are observed from the lightships Nekmangrund and Revalstein, as well as from the lighthouses Svalferort, Filsand, Tachkona, Paternoster, Odinsholm, Kokskär and Stenskär three times a day at 7, 13 and 21 o'clock.

On the lightships Nekmangrund and Revalstein current measurements and Plankton hauls near the water-level and in depths of 12,5 and 25 metres are made on the 1st, 11th and 21st of every month.

Ice observations are carried out at 30 stations on the coast of Esthonia. Ice reports are issued every morning by wireless and the thickness of the ice is measured every Friday.

All these observations are scientifically worked out at the Hydrographical Section of the University of Dorpath and are published in Esthonian and German. Such printed yearbooks may be obtained at the following address: Tartu Ülikooli Baltimere uurimise komisjon.

Finland. Biological studies.

1) A voyage along the coast from Koivisto (Björkö) in the eastern part of the Gulf of Finland to Jacobstad in the northern part of the Gulf of Bothnia has been made with the fishing vessel "Aurelia". On account of the archipelagoes and other geographical conditions, the fishery on this coast is largely dispersed, and during the cruise, information was gathered about the character and size of this fishery. The greater periodical changes during the last years were also the subject for investigation.
2) Salmon. Material for scale-analyses has been collected in four rivers: in the Kemi and Onlu in North Finland, in Kymi and Kokemäenjoki (Kumo) in South Finland.

Hydrographical work.

1) Continual observations of the temperature and salinity near the surface and at different depths have been carried out throughout the year from 26 coast stations. Observations of salinity, temperature and current near the surface and at different depths have been carried out from eleven lightships during the period when the water was free from ice.

2) Registration of the height of the water level has been carried out at fourteen coast stations.
3) Records have been made at more than 100 stations of the ice conditions in journals and sketch maps.
4) A hydrographical cruise comprising 66 stations within the Baltic and its bays north of the Gothland Deep was made in July 1926.
5) Bottom-samples have been taken from all stations and a few typical places and are being dealt with.
6) A methodical investigation of the causes of the carbon-anhydride equilibrium in the Sea is in progress.

Latvia. Statistics. During the current year, Latvia has finally organised the collecting of statistics regarding fishery by dividing its sea shore into 66 districts with a reporter on the spot in each district. The following data are received from the districts regularly every month: a) the quantity and the value of fish landed according to their different kinds; b) the number of fishing days; c) the situation of fishery; d) the number of fishermen drowned during their work; e) the value of fishing-tackle lost at sea. Also, information about the number of fishermen is compiled, whereby the fishermen are divided in two categories: professional fishermen who are mainly occupied in fishery, and fishermen for whom fishery is a spare time occupation. The districts also compile information about the number and value of fishing-tackle (boats, fishing-nets, fishing hooks) in every district, classifying these fishing-tackles according to their individuality. The above data are compiled and published by the Ministry of Agriculture in a special edition: "Bulletin statistique des pêches maritimes de Lettonie".

Salmon Investigations. Samples of scales have been accumulated in great numbers on the shore of the Gulf of Riga for investigation of age, growth and migration. Experiments were made regarding the cultivation of artificially bred Salmon in artificial ponds. The investigation of *Coregonus albula*, *Coregonus lavaretus* and *Coregonus maraena maraenoides* and *Osmerus eperlanus spirinchus* is being continued.

Plankton Investigations. The collection of Plankton is regularly continued in different places from ships along the Latvian seashore, the Baltic Sea and the Gulf of Riga.

Hydrographical Investigations. The accumulation of water samples for determining the percentage of salinity is continued in different places from ships along the Latvian seashore, the Baltic and the Gulf of Riga. All these investigations are combined with measurements of temperature.

Poland. Hydrography. The original programme of investigations was restricted to the following points:—

a) constant observations of the surface temperature of the sea water made near the Lighthouses in Rozewie and Hel, and also in the new Port of Gdynia.

b) daily observations of the temperature of the sea made one mile from the shore, south to Hel, made by the staff of the Fisheries Laboratory at Hel.

Biological Studies.

a) An account on the Bottom Fauna in the Polish Territorial Waters was published by Dr. K. Demel, assistant of the Fisheries Laboratory at Hel (Bull. de l'Acad. des Sciences de Cracovie Clas B. 1926). The list of invertebrates published by Möbius and other authors was revised and completed; observations were made concerning the nature of the bottom deposits and its relation to the respective fauna; some preliminary studies were made concerning the animal communities.

b) The Marine Fisheries Office (Morski Urzad Rybacki) at Wejherowo made some successful experiments concerning the artificial spawning and cultivation of the fry of the Baltic *Coregonus lavaretus*. Large quantities of young fish, from the hatchery at Puck were used in experiments for the acclimatisation of this species in the Inland lakes and the reproduction of this fish in the Baltic.

c) Studies on the action of different salts upon the salmonid fishes, their eggs and their fry, were continued by Dr. M. Ramult, assistant of the zoological Institute of the University at Krakow.

Limnological Studies.

A detailed study of the Salmon from Vistula and its affluents is being carried on.

Dr. Lubecki, with the aid of Mr. Dixon, published a preliminary account of the investigations made near the spawning places of the Vistula Salmon.

A very careful study of Biology of this species, the exact determination of the time of wandering and of sojourn of the salmon in the Vistula and its affluents is now being carried on by Dr. Spiczakof, Professor of Ichthyology at the University of Krakow, with the financial aid of the Fisheries Department of the Ministry of Agriculture.

Fisheries Statistics. The statistics concerning the fishery on the Polish shore are being collected in the same manner as in the past year. The figures and tables for 1925 are already finished.

In collecting the figures, special attention is paid to the economical situation of the fishermen.

General Organisation. The question of the scientific investigations of the Polish shore cannot be successfully started without organisation of the study and without a trained staff of specialists.

To attain the first of these two conditions, the Fisheries Laboratory in the Scientific Institute for Agronomical Researches at Bydgoszcz was reorganized, and the Marine Fisheries Laboratory at Hel now forms part of this Institute. Mr. J. Borowik has been appointed to the organisation of the economical part of Scientific Research.

Two Polish scientists made their researches in foreign marine Laboratories and are now continuing the study of Sea Fisheries; others are now finishing their preparatory studies in the Inland Laboratories. These workers will provide the staff for further investigations.

Sweden. In October 1925, a cruise with the research steamer "Skagerak" was undertaken to the southern Baltic for the study of the stock of the plaice and the influence of the fishing thereupon.

At the end of July and the beginning of August 1926, a cruise with the same steamer was undertaken to the eastern and middle part of the Baltic for plankton and hydrographical investigations and for fishing experiments.

During the period September 1925—August 1926 several cruises with the research motor boat "Eystrasalt" have been made in the southern and middle Baltic and in the Gulf of Bothnia along the Swedish coast for fishing experiments, plankton and hydrographical investigations.

Herring-Investigations. A lot of samples of herring have been collected from different times and from different parts of the Swedish coast for the determination of age and racial investigations. It was proved that the year-classes 1917 and 1918 of the autumn spawning herring are still frequent and that the year-class of 1922 constitutes a good part of the catches.

The vertical and horizontal migrations in different stages have been studied. Larvae have been collected by means of plankton-nets.

Sprat-Investigations. The stock of the sprat has been studied by means of fishing experiments in different parts along the Swedish coast. A considerable amount of work has been done in order to study its life during the first year.

Cod Investigations. Samples have been collected for the study of the fluctuations of the year-classes.

Much work has been done in order to ascertain the distribution of eggs and larvae. It may be mentioned that in the deep region east of Gothland the young cod-larvae were rather abundant in the first days of August, but we have hitherto failed to find the eggs or larvae in the Gulf of Bothnia.

The food of the young larvae has been investigated.

In order to study the migrations of cod marking experiments have been made on the east coast of Gothland and on the south coast of Sweden.

Plaice Investigations. In the autumn 1925, the stock of the plaice in the Bornholm Basin was studied in order to ascertain the influence of the fishing. A great number of otoliths were collected for the study of the growth. It was found that the growth is now more rapid than has previously been the case.

The distribution of the plaice eastward in the southern Baltic has been studied by means of fishing experiments.

Flounder Investigations. In order to study the migration of the flounder, marking experiments have been made in several places in Kalmar Sound between

the Swedish continent and the Island of Öland. A lot of these marked flounders have been recaptured.

Salmon Investigations. Samples of scales have been collected along the southern coast of Sweden for the investigation of the age, growth and migration of the salmon.

Plankton Investigations. Plankton-samples have been collected in the different months at different stations in the waters between the Swedish continent and the Island of Gothland and in the Gulf of Bothnia for the study of the variations in the plankton, quantitatively, from month to month and from year to year.

The diurnal vertical migrations of the copepods and schizopods, and the distribution of these animals, have been studied in the middle part of the Baltic and in the Gulf of Bothnia. A great amount of material has been collected for this purpose with different kinds of nets.

Statistics. General fishery statistics have been collected.

Hydrographical Investigations. In connection with fishing experiments and plankton collections, observations have always been made as to temperature and salinity.

The oxygen content has also been determined at different places, especially in regions with greater depths.

Water samples for the determination of the nitrogen content have been taken from one station in the middle Baltic and from one station in the Gulf of Bothnia.

Continual observations have been made from lightships along the Swedish coast. Similar observations have been carried out down to a depth of 80 à 100 m. off the north-western coast of Gothland.

PLATEAU CONTINENTAL ATLANTIQUE 1925—1926.

(Atlantic Slope, 1925—1926.)

Note administrative par Ed. le Danois.

Au moment de la réorganisation des études du Conseil International pour l'exploration de la mer, à la suite de la réunion de Copenhague 1925, il fut décidé que chaque président de secteur géographique fournirait un rapport administratif sur l'activité et les travaux faits dans son secteur pendant l'année précédente. Mais cette année était calculée d'après l'année fiscale du Conseil International qui s'étend du mois de Juillet d'une année au mois de Juillet de l'année suivante.

Depuis 1921, les rapports du Plateau Continental Atlantique ont paru avec régularité, mais tous ont concerné les travaux et les résultats de l'année astrono-

mique précédente, c'est-à-dire du mois de Janvier au mois de Décembre. Le rapport administratif demandé par le Conseil devrait donc comprendre la seconde moitié du rapport atlantique 1925 et la première moitié du rapport atlantique 1926. D'autre part, à sa réunion de Copenhague 1926, le Conseil International a décidé que les programmes d'études et les rapports administratifs porteraient désormais sur l'année astronomique et non plus sur l'année fiscale du Conseil.

En conséquence, je prie les membres du Conseil de bien vouloir considérer le Rapport Atlantique de l'année 1925 déjà publié, comme tenant lieu de Rapport administratif pour l'année qu'il concerne. Le prochain Rapport Atlantique pour l'année 1926 jouera le même rôle et sera remis au Bureau du Conseil International en même temps que les Rapports additionnels des autres Comités, c'est-à-dire en Mars 1927.

Ce prochain rapport sera publié par mes soins, avec le concours de M. le Professeur Rafael de Buen, Vice-Président du Comité du Plateau Continental Atlantique.